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ANNUAL REPORT

OF THE

NATIONAL BOARD OF HEALTH.

1879.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

THE NATIONAL BOARD OF HEALTH.

OFFICERS.

James L. Cabell, LL. D., &c .... *Pres*
John S. Billings, Surgeon, United States Army .... *Vice-Pres*
Thomas J. Turner, Medical Director, United States Navy .... *Secre*

MEMBERS.

Preston H. Bailhache, M. D., U. S. M. H. S., 1316 R st. N. W., Washington,
Samuel M. Bemiss, M. D., &c., 558 Saint Charles street, New Orleans, La.
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Henry I. Bowditch, M. D., &c., 113 Boylston street, Boston, Mass.
James L. Cabell, M. D., &c., University of Virginia, Va.
Hosmer A. Johnson, M. D., &c., 4 Sixteenth street, Chicago, Ill.
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Stephen Smith, M. D., &c., 31 West forty-second street, New York.
Thomas J. Turner, M. D., U. S. N., 1227 M street N. W., Washington, D. C.
Tullio S. Verdi, M. D., &c., 815 Fourteenth street, N.. W., Washington, D. C.

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LETTER

FROM

THE SECRETARY OF THE TREASURY,

Transmitting the annual report of the National Board of Health.

JANUARY 13, 1880.—Referred to the Select Committee on Epidemic and Contagious Diseases and ordered to be printed.

TREASURY DEPARTMENT,
January 10, 1880.

SIR: In compliance with the requirements of section 3, act March 3, 1879, and section 4, act June 2, 1879, I have the honor to transmit herewith the annual report of operations of the National Board of Health for the past year.

Very respectfully,

JOHN SHERMAN,
Secretary.

Hon. SAM'L J. RANDALL,
Speaker House of Representatives, Washington, D. C.

ANNUAL REPORT

OF THE

NATIONAL BOARD OF HEALTH.

WASHINGTON, D. C., *January* 1, 1880.

Hon. JOHN SHERMAN,
Secretary of the Treasury:

SIR: In accordance with the provisions of section 3 of the act approved March 3, 1879, entitled "An act to prevent the introduction of infectious and contagious diseases into the United States and to establish a National Board of Health," and of section 4 of the act approved June 2, 1879, entitled "An act to prevent the introduction of contagious and infectious diseases into the United States," the following account of the operations of the National Board of Health during the past year is respectfully submitted for transmission to Congress.

Under the provisions of the act of March 3 the following-named gentlemen were appointed by the President, or detailed with his approval, as members of the National Board of Health, viz:

Preston H. Bailhache, M. D., U. S. M. H. S., Maryland; Samuel M. Bemiss, M. D., &c., Louisiana; John S. Billings, M. D., U. S. A., District of Columbia; Henry I. Bowditch, M. D. &c., Massachusetts; James L. Cabell, M. D., &c., Virginia; Hosmer A. Johnson, M. D., &c., Illinois; Robert W. Mitchell, M. D., &c., Tennessee; Samuel F. Phillips, esq., Solicitor-General, District of Columbia; Stephen Smith, M. D., &c., New York; Thomas J. Turner, M. D., U. S. N., District of Columbia; Tullio S. Verdi, M. D., &c., District of Columbia.

As soon as the appointments were announced the members of the board were called together and proceeded to organize on the 2d of April, 1879. The form of this organization is shown in circular No. 1 of the board, herewith forwarded, and marked A. The board adjourned from its first meeting April 7, having appointed an executive committee, and directed it to act during the intervals of the sessions of the board. Since this first meeting the board has met eight times, viz:

Atlanta, Ga., May 5–8; Washington, D. C., June 3–17; Washington, D. C., June 25–26; Washington, D. C., July 24–25; Washington, D. C., August 19–21; Washington, D. C., October 13–16; Nashville, Tenn., November 18–22; Washington, D. C., December 16–18.

These frequent meetings have been rendered necessary from the fact that the law as it now stands does not recognize the existence of an executive committee, and hence it has been necessary to convene the full board to consider questions which the executive committee should have had power to dispose of.

The executive committee has held almost daily meetings, and has had charge of all the routine business of the board.

The principal operations of the board under the provisions of the act of March 3 have been as follows:

I. The collection of information and advice from the principal sani-

tary organizations and sanitarians of the United States as to th
plan for a national public health organization, including the sub
quarantine, both maritime and inland, and the relations which s
exist between State or local systems of quarantine and a national
antine system. This work has been performed by means of circ
printed memoranda of questions, correspondence, &c., under the
tion of the executive committee of the board, and by conference
the principal health officers of the country at Atlanta in May anc
the American Public Health Association at Nashville in Nove
After having carefully examined the data thus collected, the boar
the opinion that the conclusions of the American Public Health
ciation, as expressed in a series of resolutions which passed at the
of a discussion on this subject at a meeting of that body held at
ville, Tenn., November 18–21, 1879, may be taken as fairly represe
the opinions of the leading sanitarians and most important sa
rganizations of this country. These resolutions are as follows:

> Whereas the National Board of Health has, in accordance with the law
> created it, requested the advice of the American Public Health Association reg
> the form of a permanent national health organization of the United States, inc
> its relations to quarantine, both maritime and inland; and,
>
> Whereas the opinions of the advisory council of the association upon the s
> of health legislation, collected and presented to this body through Dr. J. M.
> chairman of the council, have been duly considered: Therefore,
>
> *Resolved*, That, in the opinion of the American Public Health Association, th
> ent National Board of Health has been of such vast service to the country th
> not expedient to make any essential change in its organization, and that any
> improvement in details should be left to the board itself.
>
> *Resolved*, That the investigations which have been commenced by the boa
> approved and should be continued, and that similar investigations should be
> taken by it into the consideration and prevention of other diseases as well as
> fever.
>
> *Resolved*, That Congress should appropriate sufficient funds to enable the bo
> employ the best talent and apparatus in such scientific and practical inquiries.
>
> *Resolved*, That the operation of the existing quarantine law and of the rul
> regulations prepared by the National Board of Health on that subject have a
> plished great good, and that no change in the law should be made without th
> careful and serious consideration.
>
> *Resolved*, That in the opinion of this association the quarantine laws of the U
> States should be under the direction of the National Board of Health and of an
> utive committee to be selected by that body.
>
> *Resolved*, That this association has no suggestions to make with reference t
> amendments to existing legislation in regard to quarantine, preferring that
> should come from the National Board of Health, as the most competent body to a
> whatever may be best.
>
> *Resolved*, That it is expedient for the National Board of Health to call an int
> tional congress for the discussion of the very important subjects of international
> tary quarantine, &c.
>
> *Resolved*, That it is the duty of the General Government to build, equip, and
> duct, at the mouth of the Mississippi River, a quarantine station, at such a pla
> may be designated by the National Board of Health.
>
> *Resolved*, That the secretary of this association be instructed to forward to th
> tional Board of Health a certified copy of these resolutions, together with the re
> and documents of the advisory council; and that the executive committee be instr
> to take such action during the next session of Congress as may seem best suit
> promote legislation in accordance with these resolutions.

The board concur in the recommendations contained in these res
tions, and, after conference with a special committee of the Nati
Academy of Sciences, concur with that committee in the follow
report and recommendations:

"WASHINGTON, D. C., *December* 27, 187

"In accordance with section 3 of the act approved March 3, 1
the committee of the National Academy of Sciences, appointed to

fer with the National Board of Health, and having power to act, report that the joint meeting resulted in the following recommendations to Congress:"

1st. That for the present no change be made in the plan of organization of the National Board of Health.

2d. That the board be by law authorized to confer on an executive committee from time to time, and in seasons of emergency, such of its powers and duties as it may deem advisable.

3d. That the board should continue the special investigations already undertaken by it, as mentioned in its annual report; and that, in addition to these, investigations should be undertaken by it, or under its direction, upon the subjects of cholera, malaria, typhoid and typho-malarial fevers, diphtheria, and cerebro-spinal meningitis.

In addition to these investigations there should also be carried on sanitary surveys of places remarkably unhealthy or liable to become so. The only limitation which should be placed on these investigations and surveys should be the amount of funds appropriated for that purpose. It is believed that, for the present, the sum to be annually allowed for such investigations and sanitary surveys should be $30,000.

4th. That the National Board should take steps to secure, as far as possible, throughout the country uniformity in the methods of collecting and reporting vital statistics; and that to this end it should call a convention of representatives of United States, State, and local authorities especially engaged in the collection and reporting of such statistics, with a view to securing agreement upon this subject.

5th. That the act to prevent the introduction of contagious and infectious diseases into the United States, approved June 2, 1879, should be so amended that in order to enforce the penalties provided in that act for vessels which shall enter, or attempt to enter, ports of the United States in violation thereof, it shall not be necessary to show that the port of departure was, at the precise time of departure of such vessel, actually infected with contagious or infectious disease, nor that ten days' official promulgation in the port from which said vessels sailed should have been effected. It seems preferable that all vessels from foreign ports coming to ports of the United States shall be required to have bills of health.

It is also recommended that the medical officer who is to serve in the office of a consul at a foreign port may be either detailed by the President or appointed by the board at its discretion.

6th. That the National Board of Health, or in the interval of its sessions, in seasons of emergency, the executive committee, shall be charged with the duty of reporting to the President when any given city or locality is considered to be dangerously infected with contagious or infectious disease; and that upon the official publication by the President of such report the transportation of goods or persons from the place thus proclaimed as dangerously infected into other States shall be forbidden under penalties to be imposed under the jurisdiction of United States courts, unless such transportation is carried on in accordance with the rules and regulations approved by the National Board of Health.

These rules shall apply until the President shall publicly declare said place no longer dangerously infected, and in the mean time the National Board of Health shall make to the President weekly reports as to the sanitary condition of such place.

7th. That the President shall be authorized to call an international sanitary conference to meet at Washington, D. C., to which the several powers having jurisdiction of ports likely to be infected with yellow

fever shall be invited to send delegates, for the purpose of securing
international system of notification as to the actual sanitary condition
ports and places under the jurisdiction of such powers and of all vesse
sailing therefrom.

8th. That the National Board of Health should proceed at once
establish quarantine stations near the mouth of Chesapeake Bay, ar
in the vicinity of Ship Island in the Gulf of Mexico; that those statio
should be provided with all the buildings, wharves, boats, and apparat
for properly treating an infected ship, including passengers, crew, ar
freight, and that they should be managed by the National Board
Health and be devoted to the treatment of infected ships entering tl
mouth of the Chesapeake Bay and bound for any of the ports situat
on its waters or the streams emptying therein, and for the ports on tl
Gulf Coast of Florida, Alabama, Mississippi, and Louisiana. It wi
then only be necessary to maintain a boarding and inspecting station
the several ports. It is recommended that the entire cost of keeping
these stations, by treating vessels at them, should be borne by tl
United States.

WEIR MITCHELL.
FRANCIS A. WALKER.
J. J. WOODWARD.
WOLCOTT GIBBS.
GEORGE ENGELMAN.
GEORGE F. BARKER.
HENRY DRAPER.
C. F. CHANDLER.
WILLIAM B. ROGERS,
President National Academy of Sciences.

II. The collecting of information with regard to the sanitary conditic
of some of the principal cities and towns in the United States. Wo
in this direction was organized at the first session of the board by tb
printing, with additions and corrections, of a series of schedules of que
tions for the sanitary survey of a city; the original schedules for th
purpose having been prepared several years previously by a committee
the American Public Health Association. A number of these schedul
have been returned to the board properly filled up, and others are in cour
of completion. It is believed that the result has already been good i
indicating the lines of inquiry which should be pursued by municip
authorities in relation to sanitary matters, and that hereafter a larg
amount of valuable information will be collected by this means.

III. The appointment of a commission to investigate yellow fever i
the Island of Cuba. This commission, generally known as the Havan
Yellow Fever Commission, consisting of Dr. S. E. Chaillé and Col. T.
Hardie, C. E., of New Orleans; Dr. John Guiterás, of Philadelphia; an
Surgeon George M. Sternberg, U. S. A., sailed for Havana on the 4t
of July, and returned on the 4th of October. The preliminary report
this commission has been printed as a supplement to the National Boar
of Health Bulletin, and a copy is herewith appended, marked B.

From this report it appears that yellow fever must be considered a
endemic in the island of Cuba, and that for many years it has prevaile
annually in the principal ports. The facts presented do not confir
the theory of the spontaneous origin of the yellow-fever poison on boar
ships, and make it improbable that the cleansing of the harbor
Havana and the constant renewal of its waters, however desirabl
would prevent the infection of the shipping at this port. Attention i

especially invited to that portion of the report which gives an account of the obstacles placed by the authorities of Cuba in the way of the execution of the law approved June 3, 1879, and to the action taken by the governor-general of Cuba in July, 1866, declaring foul all the ports of the United States, and decreeing that all vessels arriving from them at the ports of Cuba should be subjected to the most rigorous quarantine, in consequence of the report of cholera having appeared in Philadelphia. The recommendation of the report that an attempt should be made to establish an international sanitary code, and the reasons given therefor, also merit careful consideration. In this connection, however, it is to be remarked that, under the existing Constitution of the United States, and the construction placed by judicial authorities as to the scope of the police powers of the several States, it may be impossible that the United States Government should become a party to any international code of quarantine, properly so called, for the reason that it would be impossible to guarantee that, if such code were agreed upon and a vessel coming from a foreign port had complied with all its requirements, such vessels could be admitted into any port of the United States, since it is within the power of any State, and of many municipalities, to impose a quarantine of delay, or even of non-intercourse, upon any vessel arriving at their port or ports. It is for this reason that the board has attempted to secure at present only an international system of notification as to the sanitary condition of ports and vessels.

IV. The standing committee of the board on sanitary legislation, consisting of Drs. H. I Bowditch, S. M. Bemiss, and Stephen Smith, has employed a competent legal authority of Boston to collect and collate the sanitary laws of the United Srates and of the several States, including not only the statutes, but the decisions of the several courts on all questions involving the public health.

V. At the request of the board, an investigation as to the best method of determining the amount and character of organic matter in the air has been undertaken by Prof. Ira Remsen, of the Johns Hopkins University of Baltimore. A copy of the preliminary report of Professor Remsen on this subject is herewith submitted, marked C.

VI. An investigation as to the effects of disinfectants, and especially of those used for disinfecting inclosed spaces, has been undertaken by Dr. W. S. Bigelow, of Boston, assisted by Dr. H. P. Bowditch, professor of physiology, and Dr. Wood, professor of chemistry, of Harvard University, the whole being under the general direction and advice of Dr. C. F. Folsom, secretary State board of health of Massachusetts.

VII. An investigation as to the composition and merits of the various patent disinfectants, which has been made at the request of the board, by Prof. C. F. Chandler, of Columbia College, president of the board of health of New York City.

An investigation as to the prevalence of adulterations in food or drugs in the United States, under the direction of Dr. H. A. Johnson, chairman of the standing committee on this subject. In this connection a paper upon the deteriorations and adulterations of food has been prepared for the board by Dr. R. M. Kedzie, president of the State board of health of Michigan, and a paper on the adulterations of drugs, by Prof. L. Diehl, of Louisville, Ky. Copies of these reports are herewith appended, marked D and E.

VIII. A preliminary inquiry as to the diseases of food-producing animals of the United States, and the legislation, whether State or National, which seems desirable in regard to this subject.

This has been under the direction of a standing committee of the board, composed of Drs. J. L. Cabell, T. S. Verdi, and P. H. Bailhac and special reports upon the subject for this committee have been p pared by Prof. James Law, of Cornell University, New York, and T. S. Verdi, member of the board. Copies of these reports are herewi appended, marked F.

IX. An investigation of the flow of sewers in relation to their siz and gradients.

This work has been carried on under the direction of Col. George Waring, jr., of Newport, R. I., with a view to determining the most e cient and least expensive form of sewers.

The preliminary report of Colonel Waring on this subject is herewi appended, and marked G. The investigation is still in progress, a will be completed during the ensuing spring.

It may be observed that the results of this investigation have alrea been of practical importance, since it was the presentation of a porti of these result to the committee charged with the sanitary survey Memphis which led that committee to recommend a scheme for the se erage of that city, based on the researches of Colonel Waring, estimat to cost about $225,000, in preference to a plan of sewerage prepared the ordinary manner and estimated to cost $500,000.

X. A sanitary survey of the eastern coast of New Jersey borderi on New York Harbor has been made with the aid of this board, und the direction of the State board of health of New Jersey, the results which are shown in appended documents, marked H.

XI. A sanitary survey of the city of Memphis, Tenn. This was co menced as soon after the close of the epidemic as possible, and is st going on, being under the direction of a special committee of t National Board of Health, of which Dr. J. S. Billings is chairman. preliminary report of this committee, prepared to meet the urgent d mand on the part of the municipal authorities for advice as to the cour to be pursued, is herewith submitted, marked I.

XII. An investigation as to the hygiene of the mercantile marine an as to what legislation is expedient to improve its sanitary conditio The report of Surgeon P. H. Bailhache, U. S. M.H. S., especially d tailed by the chief of that bureau to prepare this report, is herewit submitted, marked K.

XIII. An investigation by Dr. Elisha Harris, of New York, upo diphtheria, as it occurred in Northern Vermont, which is herewith su mitted, marked L.

XIV. An investigation by Prof. Raphael Pumpelly, of the Unite States Geological Survey, upon the influence of various soils upon sa itation, especially with regard to drainage and methods of disposal excreta. This has been but recently authorized.

QUARANTINE.

The following is a sketch of the operations of the board under the pr visions of the act approved June 2, 1879, entitled "An act to prevent th introduction of contagious or infectious diseases into the United States.

While this act was yet pending in Congress, the board, in anticipatio of its probable passage, had held its regular semi-annual meeting a Atlanta, Ga., at the time of the meeting of the American Medical Ass ciation, having issued an invitation to all sanitarians, and especially t all quarantine officers, to meet with it there in consultation.

By this means a considerable amount of data had been collected an progress made toward the elaboration of a system of quarantine regula tions. After the passage of the act above referred to, the board met in special session at Washington without delay, and, in consultation with quarantine officers of New York, Baltimore, and New Orleans, proceeded at once with the preparation of the rules and regulations contemplated by the act.

The "rules and regulations for securing the best sanitary condition of vessels, including their cargoes, passengers, and crews, coming to the United States from any foreign port where any contagious or infectious disease exists," were completed, and approved by the President June 26, 1879, and a copy is herewith appended, marked M.

In speaking of the report of the Havana Yellow Fever Commission above, mention has been made of the fact that these rules and regulations became inoperative, so far as the island of Cuba is concerned, because of the refusal of the authorities of that island to permit of the "official promulgation" of said rules in accordance with the terms of the law. At one or two ports of other powers, also, captains or owners of vessels have refused to provide themselves with the bills of health required by these regulations, relying for immunity upon the difficulty of proving to the satisfaction of a court that contagious or infectious disease was actually existing at the port of departure at the precise time when the vessel sailed, and it is for this reason that certain changes in the law have been recommended by the board and by the committee of the National Academy of Science.

In addition to these rules and regulations, properly so called, the National Board of Health also prepared other rules, which it issued in a circular to State and municipal health authorities, with the recommendation that they should be adopted and enforced by such authorities. A copy of this circular is herewith appended, marked N.

The rules and regulations recommended in this circular for securing the best sanitary condition of steamboats or railroads connected with any point in the United States where yellow fever exists, and also those to be adopted and observed in any town or place where yellow fever is reported or suspected to exist, have thus far proved to be, in the main, satisfactory wherever they have been enforced.

As soon as the board was informed of the difficulties in the way of enforcing the rules and regulations prepared by it and approved by the President, because of the unwillingness of the authorities of foreign ports to permit the official promulgation of these rules, it gave a careful consideration to the subject, and at its meeting in Washington, D. C., October 16, adopted the following resolutions, a copy of which was duly transmitted to his excellency the President of the United States:

Whereas the board has reliable information that sections 1, 2, and 3 of the act of Congress approved June 2, 1879, entitled 'An act to prevent the introduction of contagious and infectious diseases into the United States,' have been rendered of no effect in certain foreign ports where contagious or infectious diseases have existed or do now exist, by the refusal of the authorities of such ports to permit the official promulgation of the act above referred to, or of the rules or regulations made in pursuance thereof; and

Whereas it is also known that unnecessary quarantines, to the detriment of commerce, have been enforced at certain ports of the United States against vessels coming from tropical ports, on the ground that no reliable information could be obtained as to the sanitary conditions of such ports, and that therefore it was necessary to enforce quarantine against them, and especially against ports where yellow fever might possibly exist; and

Whereas it is of great importance to all countries that the maritime transportation of contagious and infectious diseases shall be prevented, and that this shall be effected with the least possible interference with travel or commerce; and

Whereas it is the opinion of this board that prompt action is at this time especially desirable on the part of the United States, seeing that it is threatened with both yellow fever and cholera during the coming year; and

Whereas it appears that under existing legislation the Government of the Un
States may not be empowered to enter into stipulations for any complete internati
system of quarantine: Therefore,

Resolved, That to obtain a really protective quarantine with the least possible ir
rference with commerce or travel, an international system of quarantine is necess

2. That it is possible and highly desirable to secure, by international agreeme
reliable and satisfactory system of notification as to the actual sanitary conditio
maritime ports so far as regards the existence of contagious and infectious disease
such ports.

3. That to this end the president of this board is directed to lay these resolut
before the President of the United States, with the request that, if in his judgn
such course be proper, a correspondence be opened with the governments of the p
cipal nations having commercial dealings with the United States, looking to
assemblage at the earliest convenient period of properly authorized delegates on
part of such nations and of the United States, for the purpose of preparing a sys
of international notifications as to the actual sanitary condition of the maritime p
of the several powers in respect to the existence of contagious and infectious dise
and as to the best means of securing proper sanitary condition of vessels, their
sengers and crews, for the mutual protection of the several powers.

It is considered by the board that such an international agreement
is contemplated by these resolutions is highly desirable, and is, in fa
so essential to a satisfactory system of maritime quarantine, that a stro
effort should be made to secure it; and, as the best means of secur
such agreement, it has recommended that Congress should autho
and direct the calling of an international conference for this purpo
Pending the calling of such conference, if it is desired that the Uni
States shall have the advantage of the protection which the enfo
ment of the rules and regulations contemplated by the act appro
June 2 would give, the changes in the act recommended above by
board and the committee of the Academy will be essential.

The rules and regulations recommended by the board for adoption
State and local sanitary authorities have met with very general approv
and have been adopted by the following State and local boards of heal
namely:

The State health authorities of Illinois, Kentucky, Louisiana, Miss
sippi, New Jersey, North Carolina, Tennessee, Texas, and the lo
boards of health of Argenta, Ark., Brunswick, Ga., Brownsville, Te
Bayou Sara, La., Brunswick County, N. C., Cairo and Carlinsville, I
Corpus Christi, Tex., Charleston, S. C., Clarendon and Camden, Ar
Clarksville, Tenn., Cedar Keys, Fla., Delhi, La., Decatur, Ala., Dari
Ga., Devall's Bluff, Ark., Fernandina, Fla., Forest City, Ark., Huntir
don, Tenn., Helena, Ark., Indianola, Tex., Jacksonville, Fla., Jeffers
County, Miss., Lauderdale County, Miss., Louisville, Ky., Mobile, Al
Meridian, Miss., Morgan City, La., Pensacola, Fla., Pine Bluff and Pr
cott, Ark., Shelbyville, Tenn., Saint Louis, Mo., Saint Mary's, G
Tampa, Fla., Vicksburg and Warren County, Miss.

These recommendations were somewhat hastily drawn up to meet
present emergency, and it could not be supposed that they would pro
perfect. The experience of the past summer has shown that certa
improvements in these rules are desirable, but upon the whole it m
be said that they have worked satisfactorily wherever they have be
enforced.

During the present winter and spring it is proposed to review the
rules, after consultation with the State and local authorities who ha
had experience as to their practical operation.

One of the first steps taken by the board after the passage of the a
of June 2d, imposing executive duties upon it, was to appoint a certai
number of inspectors to visit the various quarantine stations, and r
port, with the least possible delay, their actual condition and necess

ties. The number of inspectors thus employed was 8; and inspections were made by them of quarantine systems and stations as follows:

Dr. Elisha Harris, from Portland, Me., to New York City.

Dr. E. M. Wight, from New York City to Baltimore.

Dr. A. N. Bell, from Norfolk, Va., to Brunswick, Ga.

Dr. W. H. Elliott, from Brunswick, Ga., to Key West, Fla.

Dr. Jerome Cochran, from Key West to Pensacola.

Dr. J. D. Palmer, from Pensacola to the mouths of the Mississippi River.

Dr. Wirt Johnston, from the mouths of the Mississippi River to Galveston, Tex.

Dr. J. H. Pope, from Galveston, Tex., to the mouth of the Rio Grande.

Through the reports of these inspectors a large amount of valuable, and in fact essential, information with regard to the actual condition and operations of the several maritime quarantine stations of the Atlantic and Gulf coasts of the United States was collected, and these reports are presented in an appendix, herewith transmitted, marked O, accompanied with maps and charts. It is especially recommended that copies of these maps and charts, properly reduced, should be prepared to accompany the publication of the report.

When the existence of yellow fever was announced at Memphis and New Orleans, in the early part of July, additional inspectors were appointed for duty at, or in the immediate vicinity of, the infected points. The total number so employed was, 17 in addition to the 8 above referred to. But these inspectors were never all on duty and under pay at the same time. The duties of these inspectors are, in part, indicated by the following extracts from a letter of instructions, of which a copy was sent to each.

* * * * * * *

> You will please understand that you are acting as the confidential agent of the board, and that the information you obtain is to be furnished directly and exclusively to the board. You will take especial care that no part of your reports shall be in any manner made public without the express consent and authorization of the board.
>
> In order that your services may be of value to the board, it is essential that you shall secure the respect and confidence of all persons whom your duties require you to meet. These duties will often require you to act as an adviser or instructor, but never as possessing positive authority, unless such authority may be temporarily conferred upon you by State or local boards of health authorized to do so. It is, therefore, all the more important that you exert all the moral influence possible in order to effect the best results.
>
> As yellow fever is the disease from which the greatest danger now exists, your special attention must be given to those measures which may prevent its spread. These may be outlined as follows:
>
> First. You will endeavor to impress upon physicians and communities with which you may be in contact the importance of a prompt recognition of the first cases of yellow fever which occur. All suspicious cases, such as hemorrhagic malarial fevers, congestive or malignant remittents or intermittents, or supposed malarial fevers which do not yield readily to the influence of quinine, must be watched and carefully and repeatedly examined in order to verify the diagnosis. Reports of such cases should be required by the local or State health authorities to be made out in such form and with such minuteness as to records of pulse and temperature at least three times a day, as to the amount and character of urine passed, and especially as to the presence of albumen in the urine, &c., that an intelligent opinion of the nature of the case, whether, namely, it was a case of true yellow fever or not, may be formed from an examination of the record.
>
> You will also take measures to have such detailed reports preserved and forwarded to the National Board of Health. You will exercise and urge the greatest care in this matter of diagnosis.
>
> The peace and comfort, if not the security, of whole communities may depend upon the report made with regard to the nature of a given case.
>
> In reporting a diagnosis to this board in a doubtful case be careful to furnish the evidence upon which your opinion is based, remembering that no diagnosis based upon one symptom alone is defensible. It must rest upon such a coexistence of symp-

toms as will exclude all other forms of disease. Whenever it is practicable an aut should be made to confirm the diagnosis.

Second. Upon the prompt recognition of the first case of yellow fever will depend the possibility of preventing its spread,

You will endeavor to impart confidence and encouragement to communities li to invasion of this disease by assuring them that its spread may be arrested by vi ous action taken at its very first appearance.

The measures which you should recommend to be adopted when a case of yellow f is discovered are as follows, being named in the order of their importance:

(*a*) *Isolation.*—No visits or admission into the rooms or houses of the sick shoul allowed except such as are indispensable for the proper attention to the sick th selves. This you will especially insist on, and if complete isolation cannot be sec by the conjoint influence of the medical attendant, the nurse, and the family, the l authorities should furnish sanitary guards, with directions to carry into effect s measures as may be necessary to secure isolation. No member of the family, incluc nurses and attendants, should be permitted to leave the house and mingle with un tected persons without taking the following precautions, viz:

They should thoroughly cleanse their persons and change their clothing be being permitted to leave the house, care being taken that the clothing to be worn of the house is free from infection. If there is doubt on this point, it should be pr ously subjected to dry heat by a thorough baking in ovens. These rules must ap also to physicians who remain long in the sick rooms, thus becoming personal att ants. Nothing which might be a vehicle for transmission of infection should be ried from the house, except in such a manner as to render it positively harmless. sick person is to be isolated who is attacked in a boarding-house, hotel, or crow family, either the sick or the well should be immediately removed from the house. inspector, in conjunction with the medical attendant, must determine which is bet but no inspector should advise the removal of yellow-fever patients except in the ea hours of the attack, or, in other words, during the paroxysm, and even then the c dition of the patient and his ultimate safety must be the paramount consideration.

If the well are removed, they should be kept under observation for at least ten da If the house or houses surrounding that in which the case is found, are so situated to render them liable to become infected, you should advise their temporary aband ment and thorough disinfection, in order, if possible, to cut off the spread of the dise by breaking the line of the communication.

(*b*) *The dead.*—The bodies of all who die of yellow fever should be immediat buried, and assemblages at funerals must be strongly discouraged, and, if necessa should be forbidden by local ordinance; the coffin should be filled with powde charcoal, and if for any good reason the burial must be delayed, the casket containi the body should be packed in an outer tight box, in which a second layer of powde charcoal should be packed in such manner as to surround it entirely, or the corpse m be thoroughly washed with a zinc solution of double strength, then wrapped in a sh wet with the zinc solution and buried at once. Metallic, metal-lined, or air-tight co fins should be used when possible; certainly when the body is to be transported any considerable distance.

When the disease is prevailing in a place under your observation, you will take sp cial care to note the place and manner of burial, whether the spread of the disea can be in any way traced to the manner of disposing of the dead.

(*c*) *Cleanliness and ventilation.*—You will urge that the rooms and surroundings yellow-fever patients shall be kept as clean and well ventilated as possible, consiste with preserving the patients from sudden change of temperature.

(*d*) *Excreta.*—The excreta of the patients should be deposited in vessels containi strong solutions of the sulphate of iron, or chloride of zinc, and it is preferable th they should be buried in pits dug for this special purpose, which should be cover with lime and earth.

(*e*) *Disinfection.*—Your special attention is invited to the circulars of the Nationa Board of Health relative to disinfection (see Circular No. 6 in No. 5 of the Bulleti and Circular 9 in No. 8 of the Bulletin). Textile fabric of small value had best b burned; if valuable, they may be disinfected by boiling for not less than half a hour. Thorough and methodical cleansing and disinfection of the entire house an premises around a yellow-fever case should be promptly performed.

You will not only urge prompt attention to these duties, but you will, in all cas where you have opportunity, personally see that they are carried out, taking ca that the sick are not annoyed by persons engaged in such duty, or by the odors chemicals which may be employed as disinfectants. No textile fabric or other mat rial should be removed from a room in such a state that infection might ensue fro it, either by evaporation by exposing them while moistened with fluid products fro the sick, or, when dry, giving rise to dust from disturbance in the process of remova After the removal of such articles from the room as should be separately disposed o the room itself should be tightly closed and thoroughly fumigated with burning su phur, in the manner prescribed in Circular No. 6 and in No. 8. This should be continued for not less than eight hours, after which the windows should be opened and the room left unoccupied for a period of from ten to twenty days.

(f) *Depopulation.*—If the place has become fairly infected before systematic efforts are made to stamp out the disease, or if such efforts have proved ineffectual, you will advise the dispersion of the population in accordance with the rules of the National Board of Health, reminding the local authorities, however, of the restrictions imposed as to charging this board with the cost of feeding the persons thus removed from the infected place.

Third. You are instructed that the explanations in the rules and regulations which imply that a town or place may be considered infected when a single case of yellow fever occurs there are not to be strictly applied. In such instances discretion must be exercised in accordance with the circumstances connected with the case. If this case is located at a point from which infection would be readily distributed, as, for instance, in a railroad depot, a large hotel, or in the center of commercial resort, it may be your duty to consider one case a sufficient reason to declare the place infected. Inspectors must not shrink from the responsibility of declaring a place infected, or dangerously infected, when good cause for such a declaration on their part is found to exist, even though local health authorities may not concur with them in such action. They must, however, before adopting such a course, and so reporting places to the National Board of Health, feel assured that it will be justified by disinterested observers.

Fourth. In visiting places which are liable to yellow fever, you will especially urge upon the physicians and the authorities of the town the importance of perfecting beforehand an organization for action in case yellow fever should occur in such town. This is necessary in order to avoid panic and to secure the best results in the isolation and disinfection above referred to.

Fifth. An important part of your duty is to collect information and transmit it to this board. The information desired is of two kinds; the first is with regard to the outbreak of disease and the manner in which the local authorities are dealing with these outbreaks. In reporting these, be careful to state distinctly whether you are reporting at second hand or from your own observation. Remember that your statement may be disputed, and provide yourself with evidence as to its truthfulness. Your position in this respect is a very responsible one. You are the eyes of the board, and you must see clearly and report accurately.

The second kind of information desired is not so much for the immediate executive purpose of the board as for scientific uses. It embraces everything relating to the causation or prevention of disease which may be of interest to the public in general, and to physicians, sanitarians, and legislators in particular.

* * *

The compensation allowed these inspectors was for the most part $10 per day and their necessary traveling expenses. Keeping in view the fact that it was necessary that these inspectors should be physicians of education and integrity, as well as competent to observe and to report the results of their observations, and also that they should have been protected from yellow fever by having had an attack of that disease, the board considers itself exceptionally fortunate in having been able to secure the services of a sufficient number of such inspectors at the rate of compensation allowed, more especially in view of the fact that these appointments were distinctly made as temporary only.

The great majority of the quarantine establishments of our seaports do not possess the facilities necessary for properly dealing with infected ships, the majority amounting to little more, practically, than inspecting and boarding stations. Owing to the epidemic of the previous summer, unusual care has been exercised by the inspecting and boarding officers at the various quarantine stations, and no satisfactory evidence has been presented to the board that any outbreak of contagious or infectious disease has occurred in this country from importation during the present year. That this is the case, however, must be attributed mainly to good fortune and the fact that no dangerously infected ship has arrived at certain quarantine stations.

It is not considered by the board to be necessary or desirable that every seaport in the United States, nor even that the majority of ports, should possess a complete quarantine establishment, including the boats, lighters, wharves, warehouses, hospitals, and other buildings necess to properly care for an infected ship and its cargo, passengers, and c in such a manner that there shall be as little detention or interfere with commerce as possible, since such establishments are expens both to establish and to maintain, and at many ports no infected s might arrive for several years.

It has therefore been decided that, for the present at all events, s complete quarantine establishments are only needed at Boston, N York, Philadelphia, near the mouth of Chesapeake Bay, Charlest Savannah, near Brunswick, Ga., or Fernandina, Fla., near Ship Isla Mississippi, and at some point on the Texas coast.

The station at the mouth of Chesapeake Bay would care for infec vessels bound for Baltimore, Annapolis, Washington, Fredericksbu Richmond, Norfolk, Petersburg, and would deal also with infected v sels bound for northern ports, which in their distress and in an em gency may put into Hampton Roads. The station near Brunswick Fernandina has not yet been positively decided on. If established would care for infected vessels destined for ports on the Atlantic co between Savannah and Key West. The quarantine station at S Island would be devoted to the treatment of infected vessels destir for the Gulf ports between and including Pensacola and New Orlea which would include the smaller ports of the Gulf coast of Flori Alabama, Mississippi, and Louisiana. The total expense of establi ing these three quarantine stations is estimated at $100,000, and as ea of them is for the protection of several States, it seeems eminen proper and desirable that they should be equipped and maintained the United States.

In addition to this, there should be expended at other ports ab $65,000. This work should be done at once in order to secure duri this winter, as far as possible, satisfactory quarantine arrangements the South Atlantic and Gulf coasts to secure the prevention of t introduction of yellow fever through any of these ports. It is the op ion of the board that if, during the present winter, at all points wh fever has prevailed during the past summer, care be taken to obt thorough ventilation and exposure to cold of all houses and inclos spaces, and of all bedding, clothing, &c., and if local sanitation be v orously and properly carried out, there will be little danger of an e demic of yellow fever next year from causes now existing in the count The board is using all its influence to induce local authorities to ins cleansing, ventilation, &c., and has reason to believe that much will accomplished before warm weather again sets in. Under these circu stances, the board is of the opinion that it is its duty to use the mea at its command to have the maritime quarantine stations of the count placed in proper condition at once, in order that they may be ready meet any emergency not later than the 1st of next May; and it the fore proposes to go on and carry out the plans above suggested witho delay.

With regard to inland quarantines and quarantine stations, mu must of course depend upon the existence of contagious or infectio disease requiring their establishment. Irrespective of this, howev it is believed by the board that inspecting stations for steamboats shou be established on the Mississippi River, at which all boats should examined by competent inspectors and certificates as to the sanita condition of the boat given. This inspection should be carried throughout the summer at all events, irrespective of the existence yellow fever or other contagious or infectious disease in New Orleans other ports upon the river, and it should apply to boats going south as well as to those going north. That such an inspection, under the auspices of this board, would be acceptable to the owners of steamboat lines on the Mississippi, the board has satisfactory evidence.

Inspecting stations for this purpose should be located at New Orleans, Vicksburg, just below Memphis, and at Cairo. At each of these stations inspecting officers should be provided with a steam-launch so arranged that in most cases the inspection could be made with little or no hinderance, or but slight delay, to the boat. At Vicksburg, Memphis, and Cairo, the stations should be so located that arrangements can be made on shore, by means of tents, &c., to deal with an infected boat should occasion present. In addition to these stations and the boats, tents, and furniture connected with them, there should be provided for the use of the board on the Mississippi River a small and fast steamboat to be used as a patrol boat, more especially for visiting places on the river reported as infected, but which are remote from railroad communication. It is often extremely difficult to obtain access to such places within any reasonable space of time, since none of the steamboats plying on the river will land at them for fear of being quarantined at other points, and there is usually a non-intercourse, "shot-gun" quarantine established around them from the land side. The result is the rapid spread of the fever, great suffering, and ultimate danger to the surrounding country. Had the board had such a boat as above indicated at its command during the past summer, it is probable that relief might have been promptly afforded to Concordia and vicinity, and that much suffering and loss of life might have been prevented. The total estimate of cost for establishing these inspecting stations and for the purchase of a small steamboat which shall be capable of making about 15 miles an hour against the current, and carrying three or four tons of freight in the shape of medical supplies, &c., is estimated at $35,000, and the board proposes to proceed at once to take the necessary steps to carry out this recommendation for the same reason as that given for acting at once with regard to the maritime quarantines, viz, that they may be ready for active operations not later than the 1st of May.

The first case of yellow fever reported to the board during the year and verified by post-mortem was that of Thomas Mulbrandon in Memphis, who was taken sick July 6, had black vomit on the 7th, and died of convulsions on the 9th. Simultaneous with this, cases were reported in the Tobin and Ray family in widely different quarters of the city. Prior to this, however, according to information furnished by Dr. W. L. Coleman, one of the inspectors of the National Board of Health, who was immediately sent to Memphis for duty upon the report of the outbreak, a case of the fever had occurred in the latter part of May in the person of John Butler, aged 21 residing with the Doriac family in South Memphis. On the 20th of May, Butler assisted Mrs. Doriac to clean up a very dirty house near the corner of Fifth and Jackson streets. All the family, five in number, occupying this house during the previous year were sick with yellow fever and the head of the family died. The house had not been thoroughly cleansed until Butler and Mrs. Doriac removed the old carpets and straw left on the floor, cleared out the rubbish and dirt and took away the mattress upon which the previous occupant had died. On the 23d of May Butler was taken sick, and on the 26th he died with suppression of urine and black vomit. A few days after Butler's death, Mrs. Doriac was taken with violent fever, which was thought to be bilious fever by the attending physician.

One or two other doubtful cases occurred in the latter part of Ju but the main outbreak was from the 4th to the 9th of July as abo indicated. In view of the simultaneous appearance of the disease the several parts of the city during a period of high temperature, a also in view of the sanitary condition of the place, it was deemed m prudent to recommend the depopulation of the city. This was effect to a large extent during the month of July. The population of the ci at the outbreak of the epidemic was estimated at 40,000. Hon. Jo Johnson, a member of the State board of health of Tennessee, reside in Memphis, estimates that there left by the river, 2,218; by railroa 15,708; went to camps about the city, 2,254; went out by dirt roa and other ways, 2,500; total number, 22,680. There were remaining the 29th of July, as per census taken, 46,119, to which he adds 10 p cent. for those omitted in the census. A system of inspections, trans stations, and of disinfection of persons and baggage, was immediat inaugurated under the direction of the State board of health of T nessee. The details of the progress of the epidemic and of the wo done in the city will be given in the appendix.

The following tables furnished by Mr. Johnson show the number cases from July 9 to November 10, 1879, inclusive:

Color and sex.	Number of cases.	Number of deaths.	Per ce
			41
White males	795	332	27
White females	503	138	18
Colored males	326	59	14
Colored females	376	54	56
Mongolian	4	2	33
Unknown	6	2	
Total	2,010	587	29

Total white cases	1,298	Total colored cases	
Total white deaths	470	Total colored deaths	
Percentage of deaths amongst whites, 36$\frac{31}{100}$, nearly.		Percentage of deaths amongst colored, 16$\frac{1}{10}$.	

The population as taken by the safety committee July 29, 1879, shown in the following table:

Wards.	Total number of persons on premises.	Whites.	Colored.	Adults.	Children.	Number who have had yellow fever.	Number who have not had yellow fever.
1	1,902	610	1,292	1,193	709	1,137	
2	787	309	478	553	235	442	
3	673	321	352	534	139	387	
4	846	374	472	626	220	432	
5	2,422	491	1,931	1,700	722	1,869	
6	1,420	378	1,042	969	451	953	
7	2,020	277	1,743	1,275	745	1,264	
8	2,362	654	1,708	1,552	810	1,636	
9	1.583	440	1,143	1,000	680	965	
10	2,095	429	1,666	1,247	848	1,358	
Unknown							1,
Total	16,110	4,283	11,287	10,651	5,559	9,743	7,

Per cent. of whites having fever in 1879, .30¼ | Per cent. of blacks having fever in 1879, .6¼.

The origin and progress of yellow fever in New Orleans during t summer of 1879 has been carefully investigated by Dr. Joseph Holt, that city, an abstract of whose reports on the subject is given in t appendix. It is sufficient to say here that the first case in New Orleans probably occurred about the middle of June. In immediate connection with these first cases was an outbreak at Mississippi City in the early part of July. The total number of cases during the summer was 41, all of whom were whites. Of these, there were males 22, females 19. There were 19 deaths. The infected locality comprised an area of about 40 squares in the fourth district. The disease also appeared in several other portions of the city widely remote from each other. Through the efforts of the State board of health and the auxiliary sanitary association of New Orleans, assisted by the National Board, a very thorough cleansing and disinfection of the infected portion of the city was carried out. When this was effected the disease disappeared. How far this was a coincidence and how far a consequence, it is impossible as yet to assert. The details of the course of the fever in New Orleans, as well as in Morgan City and the Teche country, in Concordia, Miss., and Forest City, Ark., were published in the Bulletin from week to week during the progress of the epidemic.

Yellow-fever record for the State of Louisiana for 1879.

Locality.		Cases.	White.	Colored.	Deaths.	Recovered.
New Orleans		41	41	0	19	22
Centreville		44	42	2	14	30
Cypremort		33	25	8	9	24
Morgan City		89	86	3	25	64
Bayou Boeuf		77	55	22	21	56
Pharr place		6	6	0	5	1
Mary plantation		45	4	41	3	42
La Fourche Crossing		40	20	0	9	81
Pattersonville		2	2	0	0	2
Berwick		75	66	9	16	59
Napoleonville	Napoleonville and vicinity.	3	2	1	0	3
Foley place		4	3	1	2	2
W. W. Pugh place		33	3	30	0	33
Arceneau place		45	5	40	3	42
Deslonde place		39	9	30	1	38
Ancoin house		6	6	0	3	3
Friaux place		2	2	0	1	1
Deslonde Brothers' place		1	1	0	0	1
Blanchard place		1	1	0	1	0
Malboit place		1	1	0	0	1
Vivian place		4	1	3	0	4
Upper Texas place		1	1	0	0	1
Lower Texas place		30	30	0	7	23
Attakapas Canal		62	62	0	18	44
Thibodeaux		1	1	0	0	1
French settlement below La Fourche Crossing		60	60	0	5	55
Total		745	555	190	162	583

The experience of the summer in regard to yellow fever, and the possibility of restricting its spread has been instructive, and, to a very considerable extent, satisfactory. When the outbreak at Memphis was announced there was great uncertainty as to the possibility of confining the disease to that city without establishing total non-intercourse, and a panic at once occurred along the river and the lines of railroad connected with Memphis, leading to the establishment of local quarantines, which, to a great extent, prevented any communication with the infected city.

It was therefore impossible to say at first how far the inspecting and transfer stations, established around the city by the State board of health of Tennessee, and the carrying out by that body of the rules and regulations which had been recommended by the National Board Health for such a case, had been effective in preventing the spread the disease. But as confidence began to return gradually many the local quarantines were either discontinued or relaxed much fr their rigor, and when, at a later period in the summer, the disease peared at Morgan City, it was found quite practicable to keep up c stant communication under the rules without producing any spread the fever, and it is gratifying also to be able to report that no spread the disease occurred from the railroad communications with Mempl so that it gradually became apparent that the local non-intercou quarantines were not only injurious and obstructive to commerce, l unnecessary. These local quarantines, however, were substantially that the people of the several States most immediately interested l to depend on, exclusive of the aid furnished by the National Board Health, since none of these States possessed boards of health prope organized and furnished with means to meet such emergency. Flori Arkansas, Texas, Missouri, Indiana, and Ohio had no State boards health. The State of Texas, it is true, had a health officer, and t State of Arkansas had what was called a board of health, created the governor at the recommendation of the State medical society, l without any special warrant of law. The State boards of health of K tucky and Mississippi were merely advisory, having no funds, and v little power. The State board of health of Tennessee had suffici power, but no funds. This was substantially the case also with t State board of health of Alabama. The State board of health of Lou iana is only such in name, as it is really only the board of health of N Orleans, with power for quarantine purposes. This board had no fun sufficient for the emergency. The State board of health of Illinois h sufficient power and more funds than the different boards above m tioned, but not sufficient to properly keep and maintain a quaranti station at Cairo. But none of these boards had sufficient authority a prestige to interfere with the local and obstructive quarantines.

The regulations adopted by the National Board of Health in rega to giving pecuniary aid to the State and local boards in this emergen under the provisions of section 3 of the act approved June 2, are sho in Circular No. 7, issued by the board, which reads as follows:

CIRCULAR NO. 7.

The following rules govern the action of the National Board of Health at pres in aiding State and local boards to enforce regulations of such boards preventing t introduction of contagious and infectious diseases into the United States, or into a one State from another:

1. The regulations to be enforced are those of State and local boards, whetl adopted at the recommendation of the National Board or otherwise, and not those the National Board. The National Board has recommended certain regulations t adoption by State and local boards. Up to the present time these recommendatio have been adopted by the following boards, viz:

The State boards of Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Ne Jersey, North Carolina, and Tennessee; the local boards of Brunswick, Ga.; Brown ville, Texas; Bayou Sara, La.; Cairo, Ill.; Carlinsville, Ill.; Decatur, Ala.; Delhi, La Fernandina, Fla.; Huntington, Tenn.; Jacksonville, Fla.; Lauderdale County, M sissippi, Meridian, Miss.; Mobile, Ala.; Pensacola, Fla.; Shelbyvile, Tenn.; Sai Louis, Mo.; Tampa, Fla.; Vicksburg, Miss.

The regulations of the above-named boards are therefore, to a certain exten uniform, and approved by the National Board, and therefore are such as it will a in enforcing when necessary.

State and local boards which have not adopted the recommendations of the Nation Board are requested to do so as soon as convenient, in order to secure uniformity action.

It should be observed that these recommendations are for a minimum amount precaution, and therefore that additional precautions may be taken by State or local boards, if deemed necessary, it being borne in mind all the while that the end in view is to secure or restore the public health by measures which interfere with travel or traffic as little as possible; in other words to render commerce *secure;* and (with rare exceptions) *not to put an end to, or even suspend it.* In this connection it is proper to add that non-intercourse quarantines, especially by *local* authorities, are not approved by this board.

2. Applications to the National Board of Health for aid should be made by or through the State board; or in case there is no State board, then by or through the governor of the State.

3. Application for aid should give *details* of what is required, and the estimated cost for each item. Amongst other things should be specified the duties and powers of the of the officers whose appointment or payment is requested.

4. The application should be accompanied by an official certificate from the governor of the State or the mayor or other chief officer of the municipality, respectively, to the effect that there are no State or municipal funds available to carry out the particular sanitary measures because of which the application is made. Official information should be given therein of the adoption by such State or local board of any rules and regulations that have been recommended in such case by this board, and of any other State or local rules and regulations that appear to be necessary for the purpose in question.

5. Of the supplies required for the sick, those furnished by this board to local authorities shall, as a general rule, be applied to other objects than those of shelter and furniture, which should be furnished by such authorities. Where, however, it shall be otherwise ordered the local authorities will be expected to account to this board from time to time for the safe-keeping and proper use of the furniture, provisions, medicines, &c., so furnished.

6. Whenever this board shall order the erection of temporary buildings, or provide any buildings for the purpose of quarantine, the necessary contracts therefor shall be made by one of its own officers or agents, subject to the approval of the board or of its executive committee.

7. Care should be taken that the officers to be paid from funds furnished by the national board are employed only in such number and for such time as there is actual need of their services. The National Board of Health reserves the right of judging from time to time, by means of reports received from its own agents, whether such need exists.

8. Funds are not furnished by the Treasury to State or local boards. They are placed in the hands of the disbursing agent of the National Board of Health, by whom bills, properly certified and approved, will be paid by check on Washington or New York. All bills must be in accordance with the estimates as approved by the Secretary of the Treasury, must be made out in duplicate on forms furnished by the National Board, and be *certified* as to their correctness by some authorized officer of the State board or by the governor of the State, and must be approved by some member or special inspector of the national board duly authorized. All bills for services rendered or for articles furnished local or State boards must be sworn to by the person rendering the service or furnishing the articles.

The names of all persons whose services as inspectors, &c., are to be paid for out of its funds, must, previously to their appointment, be submitted to and approved by the National Board.

It is expected that at the close of the season a full report will be made by State boards of health to the National Board as to their operations in carrying out those rules and regulations for the prevention of the spread of yellow fever in which the national board has rendered aid and co-operation, and it is desired that copies of all orders issued from time to time to inspectors shall be promptly furnished to this Board.

It is to be remembered that a full account of its expenditures must be made by the National Board of Health to Congress, and that such account ought to set forth these expenditures in detail, and exhibit their propriety and necessity.

It is therefore essential that State and municipal boards shall co-operate with the National Board in supplying material for such an account, and it is earnestly desired that they will preserve and furnish due evidence of the propriety of each item of their expenditure, for both persons employed and articles purchased with the funds in question; particularly as the future aid of both State and national boards must depend largely upon the record for efficiency and economy made during the year now current.

9. State and municipal boards of health which receive aid from this board are requested to furnish weekly reports to this office of their operations, including copies of orders issued by them and of reports made to them by their quarantine and sanitary inspectors with reference to the occurrence of cases of yellow fever and to measures adopted for isolating such cases; such reports to be presented in a form suitable for publication in the Bulletin.

The operation of these regulations was upon the whole satisfactc Some confusion and delay occurred because of the failure of some p sons to understand the requirements of the Treasury Department as the form of vouchers, receipts, &c., but all these gradually disappear All disbursements being made by the disbursing agent of the board s tioned at the central office in Washington, it became sometimes nec sary for the local authorities to advance money to laborers employed the day or for brief periods of time, and this was also the occasion some delay and dissatisfaction. Should a similar emergency ag occur, it will probably be found expedient to send a disbursing cl of the board to pay this class of employés promptly upon some form roll or voucher to be approved by the auditing officers of the Treas Department.

It is a matter of regret that isolation of the first cases could not ha had a fair trial in Memphis. The disease, however, had become fai established in several different localities before its existence was pu licly known, and a number of cases of a mild type had occurred amo the negroes who had not called in any physician and among whom t existence of the fever was not known until some time afterwards; a it is owing to this difficulty of securing prompt information as to t existence of the earlier cases that is due one of the great obstacles the way of securing the proper amount of isolation. A large amou of work was done during the summer in the city of Memphis by t State board of health of Tennessee, assisted by the National Board Health, in destroying infected material and in disinfecting infect premises, all of which was valuable, not only for its immediate effec but for the prevention of the reappearance of the disease in that ci during the coming summer.

In concluding this portion of the report the board takes great plea ure in stating that the operations of the State and local boards aid by it were harmonious and satisfactory, and that all the officers of the boards showed great interest in the work, furnishing information ar rendering services of great value to this board, irrespective of the ir mediate results which all parties were trying to reach.

The same may be said of the inspectors employed by this board i or in the immediate vicinity of, infected points, many of whom labore with an energy and constancy worthy of the highest praise.

In this connection the board desires to call special attention to th services rendered in Memphis by Dr. J. W. Ross, passed assistant su geon, United States Navy. This officer, having volunteered for servic in connection with yellow fever, was assigned to duty in Memphis o the 22d of August, and on the 26th of August was placed in charg there as the inspector representing the National Board of Health, to c operate with the State and local health authorities to prevent the sprea of the disease. Dr. Ross remained on this duty until the close of th epidemic, when he was relieved and returned to his proper station o the school-ship Saint Mary's at New York. The position filled by Dr Ross was one which required great energy and administrative ability and the board takes great pleasure in stating that his duties were i every respect satisfactorily performed.

After the passage of the joint resolution authorizing the Secretar of the Navy, at the request of the National Board of Health, to place gratuitously, at the disposal of the commissioners of quarantine, or th proper authorities at any of the ports of the United States, to be use by them temporarily for quarantine purpose, such vessels or hulk belonging to the United States as are not required for other uses of th national government, approved June 14, 1879, an application was made to the Secretary of the Navy on the 7th of July for such hulks for use at the ports of Wax Bayou and Atchafalaya.

It was found, however, that the Secretary of the Navy did not construe this resolution as authorizing him to have said vessels or hulks delivered at the places at which they were to be used, and for this reason, as well as on account of the lateness of the season when this decision was reached, no action has been taken under the resolution. The use of hulks, especially if old and containing much decayed wood, for hospital purposes in connection with yellow fever, or the placing such hulks in positions where they are liable to become infected with yellow fever, is only justifiable in cases of special emergency, or in places where it is impossible to secure the space necessary for the pitching of tents or erection of cheap temporary wooden structures.

Under the provisions of section 2 of the act approved June 2, which provides, "That upon the request of the National Board of Health the President is authorized to detail a medical officer to serve in the office of the consul at any foreign port for the purpose of making the inspection and giving the certificates hereinbefore mentioned: *Provided*, That the number of officers so detailed shall not exceed at any one time six," a request was made for the detail of two medical officers, skilled in naval hygiene, to serve at the ports of Havana and Mantanzas respectively. It was found, however, extremely difficult to obtain the detail requested, for the reason that no officers were available for such service who had had yellow fever, and the board was unwilling to send to these infected ports and charge with the special duty of examining infected vessels and localities gentlemen who were not thus protected by an attack of the disease. The result was that but one officer was found to be available. This gentleman, Dr. Somerset Robinson, medical inspector, United States Navy, was detailed for duty at the port of Mantanzas, and set sail for that port on the 14th day of August, 1879. His relief from duty was approved on the 18th day of October, there being no further necessity for inspections at that port; and the board desires to return thanks for the services thus rendered.

By the terms of the act "to authorize the Secretary of the Treasury to contract for the purchase or construction of a refrigerating ship for the disinfection of vessels and cargoes, and for other purposes," approved April 18, 1879, it was made the duty of the National Board of Health to recommend with regard to the form of steam-vessel and refrigerating machinery to be used for this purpose. This was done by a letter to the Hon. John Sherman, Secretary of the Treasury, under date June 17, 1879, after having obtained the aid and counsel of a board of experts in naval engineering and ship construction, convened at the request of this board by the courtesy of the Secretary of the Navy. All the documents and correspondence in connection with this subject have been presented to Congress in a letter from the Secretary of the Treasury in reply to a Senate resolution of June 23, 1879, and published as Executive Document No. 33, Senate, Forty-sixth Congress, first session, to which reference is made for further information on this point; and to Executive Document No. 30, Forty-sixth Congress, first session, being a letter from the Secretary of the Navy in reply to Senate resolution, June 17, 1879, and transmitting a copy of the report of the naval engineer officers appointed to examine plans and specifications of refrigerating ship and machinery, reference is made for further information.

It is understood by the board from the annual report of the honorable Secretary of the Treasury that no action has been taken in this matter, and that the whole subject has been referred for additional action by Congress, if such should be deemed expedient.

In this connection the board would respectively observe that, in its opinion, it is not expedient that the construction of such disinfecting ship should be carried out by contract given to the lowest bidder. If such ship is to be constructed at all, it should be for disinfecting purposes, including not merely apparatus for refrigeration, but also for disinfection by dry heat, by superheated steam, by disinfecting gases or vapors, &c.; it should also have means for disinfecting clothing and bedding. Such a ship must necessarily contain a large amount of machinery entirely new in design and pattern, and of which it is extremely difficult to make any accurate estimate of cost; this is especially the case with regard to the machinery proposed for the ship recommended by the board of naval engineers, which contains much machinery of a kind never before constructed, and which will require special skill and, in all probability, repeated trials for its satisfactory adjustment. It is the opinion of the board that it would be wiser, if the construction of such a ship should be carried on, that it should be done at one of the navy-yards, under the direction of the Secretary of the Navy, and that the gentleman who furnishes the designs and specifications for such ship should be paid a fair amount for such designs and specifications, and also for his supervision of the construction of the vessel.

When such vessel is completed, the operation of her machinery should be fairly tested at some Northern port, as for instance in the harbor of New York, before being sent to any of the South Atlantic or Gulf ports.

The board submits herewith an account of the expenditures from the date of its organization to December 31, 1879:

Expenditures of the National Board of Health, December 31, 1879.

Furniture	$1,824 08
Employés	11,216 48
Miscellaneous expenses	1,319 09
Rent	875 00
Light and fuel	187 80
Stationery	1,141 75
Pay and expenses of board	7,371 91
Pay and expenses of executive committee	1,439 85
Telegrams	1,389 71
Postage	481 36
Printing Bulletin	2,095 77
Printing blanks, &c	1,700 96
Quarentine expenses, pay and expenses of inspectors	11,797 29
Miscellaneous investigations (act March 3, 1879)	1,772 40
Conference with sanitarians	178 25
Havana commission	12,314 34
Services of T. J. Taylor (act June 2, 1879)	540 00
Expended in State of Louisiana	13,628 30
Expended in State of Florida	3,006 28
Expended in State of Tennessee	47,742 03
Sanitary survey, Memphis, Tenn	903 75
Expended in State of Mississippi	13,180 24
Expended in State of Illinois	3,849 77
Expended in District of Columbia	520 00
Expended in State of Arkansas	7,539 51
Expended in State of Texas	115 00
Expended in State of Alabama	150 00
Floating quarantine stations	3,915 15
Ship Island quarantine	1,806 35
Total expenditures	154,002 42

But one case has occurred in which, in the opinion of the board, it was desirable to take action under the provisions of the latter clause of section 3 of the act approved June 2. This case arose from the complaints made by the health authorities of Philadelphia that vessels coming from infected ports were boarded by boarding-house runners from that city at points outside of the jurisdiction of its quarantine authorities. The board having ascertained by a special inquiry that neither the State of Delaware nor New Jersey could execute and enforce regulations adequate to meet the emergency, reported the fact to the President of the United States, and were authorized by him to carry out the provisions of the law as set forth in said section. Under this order the board framed certain additional rules and regulations, a copy of which is given in No. 10 of the Bulletin, page 84, which were approved by the President August 22, 1879. To carry out these rules, Surgeon J. W. Coles, United States Navy, was detailed by direction of the President. That officer proceeded to Philadelphia to confer with the health authorities of the city, and after consultation reported that in view of the lateness of the season it was not considered desirable to establish this quarantine station or to attempt to carry out the proposed rules and regulations during the present year, which recommendation was approved by the executive committee.

The matter has since been investigated by an officer of the board, who, after conference with the board of health of Philadelphia, and with some of the leading merchants and ship-owners of that city, reported that the danger of the introduction of contagious or infectious diseases at this port by evasion of its quarantine is not at present sufficiently great to warrant the expense to the United States or the hindrance to commerce which such an inspecting station as was proposed by the board would entail, if the quarantine station of Philadelphia is to be continued as at present. The board have therefore advised the President that in its judgment it is expedient to cancel the rules made by it and approved by him relative to this station.

It is believed that hereafter it may be desirable that the United States should establish a complete quarantine station at some point below Newcastle on the Delaware, which station would remove the necessity for any State or local quarantine higher up the river.

The requirements of the 4th and 5th sections of the act approved June 2, 1879, have been met by the weekly publication of the National Board of Health Bulletin, a complete file of which, to date, accompanies this report. The total number of copies of the Bulletin regularly issued is 4,500.

The duty imposed on the board by section 3 of the act approved July 1, 1879, has not yet been performed, for the reason that Drs. Bemiss and Cochran have been occupied throughout the summer for the board in sanitary and professional work connected with the epidemic, and Colonel Hardee has been employed on the Havana commission; hence these gentlemen have been unable to complete their reports. They will be placed in the hands of the board during the first week in January. In connection with this report, to present it in proper form, it will be necessary to reproduce about a hundred maps of cities and towns, prepared by Colonel Hardee, and also a number of diagrams of the record of temperatures, prepared by Dr. Bemiss. The total cost of the work is esti- as follows at the Government Printing Office:

The estimated cost of 10,000 copies of the report of experts on the yellow-fever epidemic of 1878 is as follows:

Composition	$1,461 60
Presswork	945 00
Folding	422 24
Paper	4,130 49
Binding	1,500 00
Total	8,459 33

The report of Drs. Bemiss, Cochran, and Colonel Hardee, including the necessary illustrations, will cost about as follows:

Composition	$1,753 92
Presswork	1,125 00
Folding	594 00
Lithographing	4,400 00
Paper	4,937 28
Binding	3,000 00
Total	15,810 20
Grand total	24,269 53

Appended to this is given an estimate of expenditures from January 1 to June 30, 1880, and of expenditures from July 1, 1880, to June 30, 1881.

It will be perceived that to meet these estimates the sum of $90,392.42 should be appropriated for the use of the board in addition to the balance of funds which it has on hand.

In addition to this estimate it is advised that an appropriation of about $100,000 be made to be held in reserve for the emergency of the occurrence of such an epidemic as that of 1879, and to be used solely for purposes of inland quarantine in case of such an outbreak.

From January 1 *to June* 30, 1880.

For establishment of quarantine stations at mouth of Chesapeake Bay, at Ship Island, and near Brunswick, Ga., or Fernandina, Fla	$100,000
For improvement of quarantine station at Charleston	12,000
For aid to other quarantine stations	48,000
For establishing inspecting stations on the Mississippi and for police boat	35,000
For special investigations and surveys*	21,500
For printing report on yellow fever (see details above)	25,000
For printing report of board with appendices	8,000
For salaries and traveling expenses of inspectors	10,000
For salaries and traveling expenses of members of the board	5,000
For rent, light, and fuel	800
For clerks, messenger, and watchman	10,530
For stationery	1,500
For postage	500
For telegrams	500
For printing of Bulletin	2,500
For other printing	1,500
For contingencies and miscellaneous	2,000
Total	284,330

From July 1, 1880, *to June* 30, 1881.

For maintenance of quarantine and inpecting stations under immediate control of the board	$65,000
For aid to State and local quarantines	30,000
For special investigations and sanitary surveys	30,000
For salaries and traveling expenses of inspectors	20,000
For salaries and traveling expenses of members of the board	10,000
For rent, gas, and fuel	1,700
For clerks and messengers	21,060
For stationery, postage, and telegrams	5,300
For printing of Bulletin	5,000
For printing of annual report	6,000
For other printing	3,000
For contingent and miscellaneous	5,000
Total	202,060

JAMES L. CABELL,
President of National Board of Health.
T. J. TURNER,
Secretary of National Board of Health.

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* Most of these are now in progress.

APPENDICES.

REPORTS AND PAPERS.

REPORTS AND PAPERS.

APPENDIX A.

ORGANIZATIO

I.

CONSTITUTING ACT.

AN ACT to prevent the introduction of infectious or contagious diseases into the United States, and to establish a National Board of Health.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there shall be established a National Board of Health to consist of seven members, to be appointed by the President, by and with the advice and consent of the Senate, not more than one of whom shall be appointed from any one State, whose compensation, during the time when actually engaged in the performance of their duties under this act, shall be ten dollars per diem each and reasonable expenses, and of one medical officer of the Army, one medical officer of the Navy, one medical officer of the Marine Hospital Service, and one officer from the Department of Justice, to be detailed by the Secretaries of the several departments and the Attorney-General, respectively, and the officers so detailed shall receive no compensation. Said board shall meet in Washington within thirty days after the passage of this act, and in Washington or elsewhere from time to time upon notice from the president of the board, who is to be chosen by the members thereof, or upon its own adjournments, and shall frame all rules and regulations authorized or required by this act, and shall make or cause to be made such special examinations and investigations at any place or places within the United States, or at foreign ports, as they may deem best, to aid in the execution of this act and the promotion of its objects.

SEC. 2. The duties of the National Board of Health shall be to obtain information upon all matters affecting the public health, to advise the several departments of the government, the executives of the several States, and the Commissioners of the District of Columbia, on all questions submitted by them, or whenever in the opinion of the board such advice may tend to the preservation and improvement of the public health.

SEC. 3. That the Board of Health, with the assistance of the Academy of Science, which is hereby requested and directed to co-operate with them for that purpose, shall report to Congress at its next session a full statement of its transactions, together with a plan for a national public health organization, which plan shall be prepared after consultation with the principal sanitary organizations and the sanitarians of the several States of the United States, special attention being given to the subject of quarantine, both maritime and inland, and especially as to regulations which should be established between State or local systems of quarantine and a national quarantine system.

SEC. 4. The sum of fifty thousand dollars, or so much thereof as may be necessary, is hereby appropriated to pay the salaries and expenses of said board and carry out the purposes of this act.

Approved, March 3, 1879.

II.

BY-LAWS.

1st. The officers of the National Board of Health shall consist of a president, vice-president, and secretary.

2d. There shall be an executive committee, composed of the president, vice-president, secretary, and two other members.

3d. The officers of the board and the other members of the executive commit shall be elected by ballot at the first annual meeting in each year.

4th. The duties of the president shall be—

1st. To preside at all meetings of the board and of the executive committee.
2d. To call meetings as provided in the act creating the board.
3d. To make requisitions upon the Secretary of the Treasury for such sums as n be directed by the board.

5th. The duties of the vice-president shall be to take the place and perform duties of the president when absent.

6th. The duties of the secretary shall be to keep the records and conduct the co spondence of the board and of the executive committee, to certify to the correctn of all vouchers for expenditures, and to perform such other duties as the board executive committee may from time to time direct, and he shall be the custodian of papers, books, and other property of the board.

7th. The duties of the executive committee shall be to carry into effect the dir tions of the board, and to act for it during the intervals of its sessions, reporting su action to the next meeting.

8th. No purchases shall be made or expenditures incurred except by order of t board or of the executive committee, and the executive committee shall not ha power to incur any indebtedness beyond the amount of the funds authorized by t board, to be drawn by the president, and placed to the credit of the board with t disbursing clerk of the Treasury Department.

9th. All bills for salaries and expenses shall be duly certified by a member of t board, and audited and approved by the secretary of the board, who shall keep accurate record of such vouchers and approvals.

III.

RULES.

RULE 1. In the election of officers the nomination shall be by informal ballot.

RULE 2. The standing committees of the board shall be as follows, each to be con posed of three members, to be named by the president, with the exception of that o epidemic and contagious diseases, which shall consist of five members:

1st. On rules and interpretations of the constituting act and by-laws.
2d. On finance and accounts.
3d. On epidemic and contagious diseases, including quarantine.
4th. On adulterations and deteriorations of food and drugs.
5th. On registration and vital statistics.
6th. On State, municipal, and local sanitary legislation.
7th. On the diseases of domestic animals.

RULE 3. The regular meetings of the board shall be semi-annual, in May and Octo ber of each year, the precise date and place to be fixed by the executive committee

RULE 4. The President shall call a meeting of the board whenever five member make in writing, or by telegraph, a joint request to him to that effect.

RULE 5. The executive committee shall be considered to be in permanent session and in the interval of the regular meetings any three members, of whom the secretar shall be one, shall constitute a quorum, and be authorized to transact any busines provided there be a concurrent vote. In case of disagreements the secretary shall b required to report the fact to the absent members and solicit an expression of thei wishes as to the call of a formal meeting of the whole committee, or as to taking vote by correspondence.

IV.

COMMITTEES.

1. On rules and interpretation of the constituting act:
   1. S. F. Phillips.
   2. P. H. Bailhache.
   3. T. J. Turner.
2. On finance and accounts:
   1. J. S. Billings.
   2. T. S. Verdi.
   3. S. Smith.

3. On epidemics and contagious diseases:
    1. S. M. Bemiss.
    2. R. W. Mitchell.
    3. J. S. Billings.
    4. H. A. Johnson.
    5. H. I. Bowditch.
4. On adulteration and deterioration of food and drugs:
    1. H. A. Johnson.
    2. T. S. Verdi.
    3. H. I. Bowditch.
5. On registration and vital statistics:
    1. S. Smith.
    2. R. W. Mitchell.
    3. H. A. Johnson.
6. On State and municipal and local sanitary legislation:
    1. H. I. Bowditch.
    2. S. M. Bemiss.
    3. S. Smith.
7. On diseases of domestic animals:
    1. J. L. Cabell.
    2. T. S. Verdi.
    3. P. H. Bailhache.

EXTRACTS FROM THE MINUTES.

APRIL 2, 1879.

Ordered, That the discussions and deliberations of the board shall be considered confidential so far as regards the public press, or any source through which they may be likely to reach the public press, except when authorized by the board and communicated through the proper officers.

The committee appointed to report to the National Board of Health in regard to the question as to whether Senate bill No. 55, as amended and passed by the Senate on the 1st instant, should be recommended for passage by the House, reported as follows:

First. All attempts at disinfecting vessels and cargoes by artificially-produced cold, must in the present state of our knowledge be regarded as experimental, since there is no satisfactory evidence in existence as to whether the application of a temperature as low as zero in a ship for a comparatively short period of time, that is, for a few hours, will destroy or render perfectly harmless the yellow-fever poison.

Second. From what is known of the effects of naturally occurring low temperatures upon this disease, we are of the opinion that the experiment should be tried. So far as regards the proper methods of constructing such a vessel, or the machinery to be placed in it for this purpose, or as regards the proper and reasonable cost of such vessel or the description of machinery, the National Board of Health has no special knowledge.

Third. It would be necessary for the board to obtain testimony from naval constructors and from engineers upon these points. It is eminently proper for the Board of Health in its discretion to advise that a thorough trial be made with artificially produced cold as a disinfectant for vessels infected with yellow fever, and to superintend and direct such trials of any given apparatus, but it would be in our judgment preferable that the ultimate selection of the particular form of vessel or machinery to be used for this purpose should be made by the Secretary of the Navy in accordance with the recommendation which he would obtain from the bureaus of his department.

Fourth. If the Senate bill should pass the House in its present shape, it would be expedient for the board to request of the Secretary of the Navy the decision above referred to.

All of which is respectfully submitted.

J. S. BILLINGS.
S. M. BEMISS.
T. J. TURNER.

APRIL 3, 1879.

Ordered, That Dr. R. W. Mitchell, of Memphis, Tenn., be appointed a special committee to prepare a plan of organization for relief in the case of an epidemic of yellow fever in an inland town or city, to include the organization of medical relief and of nurses. Dr. Mitchell to consult with such persons as he may see proper, and to report the plans to the board for publication after its completion to the satisfaction of the board.

APRIL 4, 18

Ordered, That the executive committee be, and it is hereby, instructed to em a commission of experts to make thorough investigations into the causes, conditi and circumstances influencing the existence and spread of yellow fever in such for places as shall be indicated in specific instructions hereafter issued.

Ordered, That the selection of the experts and other employés necessary to struct these commissions shall rest with the executive committee.

Ordered, That this commission shall be required to make a full and faithful re of all investigations instituted, and observations made, at as early a date as shal consistent to a satisfactory completion of duties assigned them.

Ordered, That the executive committee provide the funds necessary for com sation of persons employed, and the payment of all reasonable expenses, and president is hereby directed to make requisition upon the Secretary of the Trea for the funds necessary for this purpose; and the executive committee shall procure such letters from the Secretary of State as may be necessary to secu courteous reception and the co-operation of the authorities at the places ordere be assisted.

APRIL 5, 187

Ordered, That each member of the board be requested to keep the executive c mittee fully informed of all matters connected with the work of the board under cognizance, and of any matters which may be of interest, and that the chairme the several standing committees be requested to conduct the correspondence relat to the business of their committees so far as convenient, and in cases when neces delay will not injure the business, through the central office, letters being transmit through the office for memorandum and record, and to be forwarded from this po

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THE NATIONAL BOARD OF HEALTH.

PRESTON H. BAILHACHE, M. D., U. S. M. H. S. 240 Maryland avenue, Baltimore,
SAMUEL M. BEMISS, M. D., &c ....558 St. Charles st., New Orleans, L
JOHN S. BILLINGS, M. D., U. S. A ....84 Gay street, Georgetown, D. C.
HENRY I. BOWDITCH, M. D., &c ....113 Boylston street, Boston, Mass.
JAMES L. CABELL, M. D., &c..................University of Virginia, Va.
HOMER A. JOHNSON, M. D., &c................4 Sixteenth street, Chicago, Ill.
ROBERT W. MITCHELL, M. D., &c ....34 Madison street, Memphis, Tenn.
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STEPHEN SMITH, M. D., &c ....57 West Forty-second st., New Yor
THOMAS J. TURNER, M. D., U. S. N...........1227 M street, Washington, D. C.
TULLIO S. VERDI, M. D., &c ....815 Fourteenth street, N. W., Was
ington, D. C.

OFFICERS.

JAMES L. CABELL, LL. D., &c .... *President.*
JOHN S. BILLINGS, Surgeon United States Army......................... *Vice-Preside*
THOMAS J. TURNER, Medical Director United States Navy.............*Secretary.*

THE EXECUTIVE COMMITTEE.

Dr. JAMES L. CABELL.
Dr. JOHN S. BILLINGS.
Dr. THOMAS J. TURNER.
Dr. STEPHEN SMITH.
Dr. PRESTON H. BAILHACHE.

APPENDIX B.

THE HAVANA COMMISSION.

PRELIMINARY REPORT OF THE HAVANA YELLOW-FEVER COMMISSION OF THE NATIONAL BOARD OF HEALTH, SUBMITTED NOVEMBER 18, 1879, BY S. E. CHAILLÉ, M. D., CHAIRMAN, AND G. M. STERNBERG, M. D., U. S. A., SECRETARY.

This report is submitted in accordance with the following resolution of the commission adopted September 25, 1879, and subsequently approved by the National Board of Health:

"*Resolved*, That, subject to the approval of the National Board of Health, the chairman and secretary be appointed a committee to draw up a concise preliminary report, stating the general results accomplished by the commission; also, that each member make a detailed report of his own work in the investigation; which special reports shall be made with such detail and labor as may be consistent with the views of the National Board of Health and with the opportunities of the several members for the further study of the subjects which have especially engaged their attention in Havana."

The memorandum of instructions for the commission appointed by the National Board of Health to visit the island of Cuba for the purpose of investigating certain points connected with the prevalence of yellow fever in that island, states that in organizing the commission the National Board has more especially in view the following desiderata:

First. To ascertain the actual sanitary condition of the principal ports in Cuba from which shipments are made to the United States, more especially the ports of Havana and Matanzas, to determine how these sanitary conditions can best be made satisfactory, and more especially as to what can and should be done to prevent the introduction of the cause of yellow fever into the shipping of these ports.

Second. To increase existing knowledge as to the pathology of yellow fever, that is, as to the changes and results which it produces in the human body.

Third. To obtain as much information as possible with regard to the so-called endemicity of yellow fever in Cuba, and the conditions which may be supposed to determine such endemicity. This of course involves a careful examination of neighboring localities where the disease does not appear to have its cause permanently localized.

The three points above referred to are believed to be those which will most certainly yield results to scientific investigation, and which therefore should receive the special attention of the commission.

But in addition to these the National Board of Health desires that the commission shall consider certain problems relating to this disease; problems which may be entirely insoluble, but which nevertheless are of such importance that an effort should be made to decide whether the National Board of Health will be justified in undertaking the labor and expense which will probably be required to obtain anything like a complete solution of them, if such solution is at all possible. These problems relate to the nature and natural history of the cause of yellow fever, and the most important preliminary investigation on this point is to ascertain some means of recognizing the presence of the immediate cause of yellow fever other than the production of the disease in man. These means might, for example, be the production of some special phenomena in some of the lower animals, or it might be the finding of a special microdeme in all yellow-fever cases, and no others. It is obvious that if it is found possible to produce some specific symptoms in some one of the lower animals by exposing such animals in localities known to be capable of producing the disease in man, and thus establish a physiological test of the presence of the cause of the disease, we may even hope to be able to determine the nature and the natural history of this cause, although prolonged investigation may be necessary to effect it.

With the time and means which the National Board of Health can at present put at the disposal of the commission no complete investigation is possible. All that is hoped for is that the commission will be able to obtain some grounds for a positive opinion as to whether it is probable that such an investigation would put us in possession of the test referred to.

It is not proposed to go into details as to the modes of attacking this problem; but one thing is insisted on, and that is that as far as possible what is done shall be so done and so recorded that it need not be done again hereafter.

It is expected that the commission will organize itself and devise for itself the methods and order of carrying out the work above indicated. It is desired that the report to be furnished the board shall be made by the members jointly as a commission. In other words, it is expected that each member will be careful to verify the results obtained by the other members, or to note distinctly the absence of such verification.

The following extract from letter of June 26, 1879, contains further instruction

"It is the wish of the National Board of Health that the work above specified u several distinct heads should engage the earnest attention of all members of the c mission until such work is completed, to the exclusion of all other lines of invest tion, such, for example, as the clinical observation and record of cases."

The following resolutions of the National Board of Health, dated June, wer ceived:

"*Resolved*, That Dr. G. M. Sternberg, Dr. S. E. Chaillé, T. S. Hardee, C. E., and J. Guiteras, appointed to make investigations at Havana, Matanzas, and other pl in Cuba, be, and are hereby, directed to complete their organization under the titl 'The Havana Yellow-Fever Commission of the National Board of Health of the Un States,' by the election of a permanent chairman, and secretary, who shall be bursing officer of the commission, and by the adoption of rules governing the c mission.

"*Resolved*, That a quorum to transact business shall be three, and its action s be binding upon individual members.

"*Resolved*, That all official communications to the National Board of Health f the commission shall be signed by the president and secretary.

"*Resolved*, That when the commission has effected a permanent organizatio shall transmit to the National Board of Health its plan of organization, includ all its rules, and thereafter shall regularly transmit weekly reports of progress."

In compliance with the foregoing instructions, received June 20, "The Hav Yellow-Fever Commission of the National Board of Health of the United States" organized by the election of Dr. S. E. Chaillé as chairman, and Dr. G. M. Sternb as secretary, and by-laws were adopted for the government of the commission.

At a meeting of the commission held in Washington, D. C., on the 23d of June, following resolutions were adopted:

"*Resolved*, That Dr. Chaillé and Colonel Hardee be appointed a committee to c duct that portion of the investigation indicated in memorandum of instructions, 1, under headings "First" and "Third," and Drs. Sternberg and Guiteras a commit to conduct that portion of the investigation indicated in the same memorand under heading "Second," and under additional instructions following "Third," relating chiefly to the nature and natural history of the yellow-fever poison.

"*Resolved*, That each committee procure before sailing such apparatus and ap ances as will be required in that portion of the investigation under its immedi direction."

The National Board of Health, had some time previously, after consultation w Surgeon J. J. Woodward, U. S. A., ordered the following microscopic apparatus, v One army stand of Zentmyer (Philadelphia); one large stand of Powell & Lela (London), with eye-pieces, achromatic condenser, &c., and the following objectiv 4-inch, 2-inch, 1-inch, and ⅓-inch, dry, of Powell & Leland; ⅙-inch and $\frac{1}{10}$-inch, g cerine immersion, of Spencer & Sons (Geneva, N. Y.); $\frac{1}{18}$-inch, oil immersion, Zeiss (Jena, Germany); also a heliostat of Keith's pattern by Kübel (Washingt D. C.).

Unfortunately the Powell & Leland apparatus and the Spencer objectives were delivered until some time after the departure of the commission, and not received Havana until the 28th of August, when but little more than a month remained of t time allotted to the investigation. An ample supply of apparatus and accessories microscopical and chemical work, and a full stock of photographic material, was a procured in advance of the time of sailing, and, by the liberal policy of the Board Health the commission has been fully supplied with everything necessary for car ing out the instructions given it.

These instructions are, however, so comprehensive and the time allotted to t investigation has been so short that the members of the commission would fear th they have fallen short of the expectations of the board, notwithstanding the fact th they have given their best efforts to the accomplishment of the responsible duti assigned them, were it not that the following paragraph occurs in the memorandu of instructions under which they have acted: "With the time and means which t National Board of Health can at present put at the disposal of the commission complete investigation is possible," &c.

The three medical members of the commission, with Mr. Rudolph Matas, clerk, a Mr. Henry Mancel, photographer, sailed from New York, per steamship City of Was ington, on the 3d of July, and arrived in Havana on the evening of the 7th. Colon Hardee joined the commission in Havana on the 18th of August and returned to Ne Orleans September 20.

Immediately after arriving in Havana the commission established its office and la oratory in the upper story of the San Carlos Hotel, where very suitable rooms, ove looking the harbor, and conveniently located with reference to the hospitals, we found at a moderate rental. The commission was also influenced in selecting th hotel as its headquarters by the fact that Mr. H. C. Hall, United States consul-ge eral, and Dr. Daniel M. Burgess, an American physician practicing in Cuba (since appointed United States sanitary inspector of the port), resided here. To these gentlemen and to Mr. A. H. Taylor, an American civil engineer located in Havana, the commission is indebted for innumerable favors. All of these gentlemen have manifested a lively interest in the investigation, and from their long residence in Cuba and intimate knowledge of the city of Havana, its harbor, and inhabitants, they have been able to render constant and valuable assistance. Soon after its arrival in Havana the commission, accompanied by Consul-General Hall, made an official call upon the captain-general, Don Ramon Blanco, Marquis of Peña Plata. At this interview the commission learned with pleasure that instructions had already been received from the "home government" to extend to it all necessary facilities for prosecuting its work. Both on this occasion and by his subsequent acts, the captain-general evinced a willing zeal in carrying out his instructions which could only have come from a personal interest in and appreciation of the work in which the commission was engaged.

Shortly after this interview the captain-general appointed an auxiliary commission, constituted as follows:

President—Dr. Marcelina Astray de Canada, sub-inspector, first rank, of the naval board of health, honorary chief of civil administration, member of the superior board of health of the island, &c.

Members—Dr. Felipe F. Rodriguez, professor of anatomy, member of the Havana Academy of the Medical, Physical, and Natural Sciences, &c.; Dr. Vincente Luis Ferrer, secretary of the superior board of health of the island, &c.; Dr. Vincente Benitez Valdez, member of the Havana Academy, member of the superior board of health, &c.; Dr. Joaquin Garcia Lebredo, member and founder of the Havana Academy, correspondent of the Royal Academy of Medicine of Madrid, &c.; Dr. Antonio Pardinas, sub-inspector of the military health department, director of the military hospital, &c.; Dr. Casimiro Rome, sub-inspector, first class, brevet chief of the military board of health, staff officer of the captain-general, &c.; Dr. Raphael Fleitas, director of the military health park, sub-inspector, of second class, director of the Hygienic Hospital; Dr. Charles Finlay, member of the Academy of Medical, Physical, and Natural Sciences; Dr. Serafin Gallardo, professor of clinical medicine in the University of Havana; Dr. Francisco Zayas; Dr. Emiliano Nunez de Villavicencia, member of the academy, director of the Civil Hospital of San Felipe y Santiago, and secretary of the Spanish commission for the study of yellow fever.

The object in appointing this commission was that through it the United States commission might obtain promptly such information and assistance as was required, and also that there might be a permanent organization in Havana to continue the study of yellow fever after the departure of this commission. Much valuable information has been received through the Spanish commission, and to several of its members we are especially indebted. To the president, Dr. Canada, the director of the military hospitals, Dr. Pardenas, the foreign corresponding secretary of the "Academia," Dr. Charles Finlay, and to Dr. Felipe Rodriguez we are under many obligations.

For the purpose of securing as soon as possible information as to the sanitary condition of the principal seaports and inland towns of Cuba, a circular was issued by the commission soon after its arrival, embodying the instructions received from the National Board of Health, and propounding questions based upon them. The response to this circular has been the receipt of so large a number of valuable reports from the Spanish commission, from United States consuls, and from eminent physicians, that your commission has in its possession more extensive and instructive data referring to yellow fever in Cuba than have ever before been collected.

The commission held weekly meetings while in Cuba, and in compliance with its instructions made a weekly report to the National Board of Health, giving a brief account of the progress of the investigation, and reporting such facts and observations as seemed of greatest importance.

The last formal meeting of the commission in Cuba was held September 25. At this meeting the following resolution was adopted:

"*Resolved*, That, subject to the approval of the National Board of Health, the chairman and secretary be appointed a committee to draw up a concise preliminary report, stating the general result accomplished by the commission; also, that each member make a detailed report of his own work in the investigation, which special reports shall be made with such detail and labor as may be consistent with the views of the National Board of Health, and with the opportunities of the several members for the further study of the subjects which have especially engaged their attention in Havana."

In compliance with this resolution, which has received the approval of the National Board of Health, it is the intention of the committee in this preliminary report to record only the most important facts obtained and the general results of the investigation, leaving details and the discussion of unsettled problems to the individual reports of members, to be submitted hereafter.

In addition to acknowledgments already made, the commission desires to exp its obligations to the following gentlemen:

Col. R. Ceréro, of the Spanish army, commander of the engineers of the Plaza; R Father Vines, director of the meteoological observatory of the College of Belen; José R. de Armona, Marianao; Dr. Juan Antonio Beltran, Marianao; Dr. E. A. Calv Matanzas; Dr. A. G. Del Valle, Guanabacoa; Dr. A. Cuervo, Sancti Spiritus; Dr. J. Forns, Marianao; Dr. Esteban Navea, San José de las Lajas; Dr. A. W. Reyes, Gu abacoa; Dr. P. Selsis, Havana; Dr. Nicolas de la Peña, medical director of hospit Sagua la Grande; Messrs. Ariza & Herrera, city architects, Havana.

The clerk of the commission, Mr. Rudolph Matas, and the photographer, Mr. He Mancel, have performed their duties in a most zealous and satisfactory manner. Abraham Morojan, of Cuba, a recent graduate of the University of Pennsylvan rendered valuable services as interpreter and assistant in post-mortem and other wo

REPORT.

The first and third articles of the official instructions of the National Board of Hea to the Havana yellow-fever commission required it to investigate the following among other subjects, and these six will be considered in the following order:

First. The principal ports of Cuba from which shipments are made to the Uni States.

Second. The endemicity of yellow fever in Cuba.

Third. The causation of this endemicity.

Fourth. The actual sanitary condition of Havana, Matanzas, and other Cuban por

Fifth. The means by which the sanitary condition of Havana, Matanzas, and oth Cuban ports can be best made satisfactory.

Sixth. What can and should be done to prevent the introduction of the cause yellow fever into the shipping at Cuban ports.

I.

THE PRINCIPAL PORTS OF CUBA FROM WHICH SHIPMENTS ARE MADE TO THE UNIT STATES.

Cuba, situated less than one hundred miles from the southern extremity of Florid with the Tropic of Cancer between them, varies in width from 20 to 135 miles, havi an average breadth of 52 miles, extends in length 783 miles, and, with its small adj cent and dependent islands, occupying 47,278 square miles, is a little larger than t State of New York. Its extensive coast line of 2,200 miles is noted for the numb and excellence of its harbors.

Cuba has more than 200 ports. On the northern coast there are not less than elev of these rated as of the first, and twenty-two of the second class; and on the southe coast, five of the first and six of the second class. Of these forty-four princip ports, only fifteen are "ports of entry" from which shipments are made to forei countries, and hence only these fifteen are of any interest in connection with the i fection of vessels.

Of the fifteen "ports of entry" eight are on the northern and seven on the souther coast. Those on the northern coast, passing from west to east, are Havana, Mata zas, Cardenas, Sagua la Grande or Sagua, Caibarien (the seaport of Remedios Nuevitas (a seaport of Puerto Principe), Gibara or Jibara (a seaport of Holguin), an Baracoa, which was the first European settlement (1512) in Cuba, and is the presen principal port of the fruit trade.

The seven "ports of entry" on the southern coast, passing from east to west, a Guantanamo, Santiago de Cuba or Cuba, Manzanillo, Santa Cruz, Zaza or Sasa o Tunas de Zaza, Trinidad, and Cienfuegos. These fifteen "ports of entry" are impo tant to the commercial interests of the United States in the following order, begin ning with the most and ending with the least important: Havana, Matanzas, Ca denas, Sagua la Grande, Cienfuegos, Baracoa, Caibarien, Guantanamo, Trinidad Santiago de Cuba, Manzanillo, Nuevitas, Gibara, Zaza, and Santa Cruz. From th five ports first mentioned are cleared three-fourths of all the vessels which sail fro Cuba to the United States, but for reasons which will subsequently appear the po of Havana alone is of greater importance to the sanitarian than all the others.

The following table will serve to illustrate the relative commercial importance c these ports. It requires a brief preliminary explanation. While the table refers solel to American vessels it must not be forgotten that about one-third of the trade fro Cuba to the United States is carried on in foreign vessels, so that the statistical fac given refer to only about two-thirds of this trade. Further, these facts are perfect f only ten of the fifteen ports, for the reasons that the United States consuls at Guant namo, Zaza, and Manzanillo* failed to forward the necessary reports, that at Gibara th country has no consul, and that Santa Cruz not only has no consul but also is of so little consequence that during the past year no American vessel has either arrived at or sailed from it; therefore Santa Cruz is omitted:

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* The report from Manzanillo has been received, but subsequent to the compilation of the table.

TABLE NO. 1.*—*Statement of the number of American vessels, their average tonnage, and the number of their crews, sailing from the ports of Cuba to the United States during the year ending December 31, 1878.*

Ports.	Number of vessels.	Average tonnage.	Number of crew.
1. Havana	*503	653.8	10,506
2. Matanzas	313	399.5	2,615
3. Cardenas	291	334.9	2,358
4. Sagua la Grande	146	341.4	973
5. Cienfuegos	152	427.3	1,581
6. Baracoa	130	118.7	832
7. Caibarien	60	366.9	514
8. Trinidad	28	341.5	221
9. Santiago de Cuba	22	488.9	177
10. Nuevitas	3	327.8	21
Totals	1,648	†	19,797
11. Guantanamo	30 to 40	....	....
12. Manzanillo	14 to 20	....	....
13. Gibara	5 to 10	....	....
14. Zaza	3 to 7	....	....
Grand totals	1,700 to 1,725	....	20,200†

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* Tables Nos. 1, 3, and 4 have been compiled from reports kindly furnished through Mr. H. C. Hall, United States consul-general at Havana.

A Cuban report for the ten years, 1868–'77, shows that the total number of vessels of all nations which entered the port of Havana varied during said ten years from 1,650 to 2,194 per annum, the annual average being 1,803; and that of these, 717 to 944 were American, the annual average being 800. It is to be remembered that many American vessels sail from Havana to other ports besides to those of the United States.

† Average number of vessels clearing annually.

Similar data for other years and to July, 1879, indicate that this table for 1878 represents a fair annual average of recent years; and, if the figures reported for American shipping be increased one-third for the foreign shipping,* it appears that there annually pass from Cuba to the United States not less than 2,500 vessels, carrying some 30,000 sailors. What number of persons in addition to these 30,000 sailors pass annually to the United States from Cuba is not known, but it was found that from 4,000 to 6,000 passengers travel every year between the United States and the single port of Havana.

While these facts seem to reply sufficiently not only to the question, "What are the principal ports of Cuba?" but also to the question, "What is the amount of intercourse with and relative importance of these ports?" it has been deemed essential, in connection with present or future quarantine and other sanitary regulations, to investigate three other questions subordinate to the main one. These are, 1. What is the amount of intercourse between each of the various ports of Cuba and each of the various ports of the United States? 2. During what seasons of the year is this intercourse greatest and least? 3. What is the value of this intercourse to the United States? On these three questions much detailed information has been gathered, which is deemed too lengthy for presentation in this preliminary report. However, a sufficient number of facts will be presented to promote an intelligent appreciation of these subjects.

1. WHAT IS THE AMOUNT OF INTERCOURSE BETWEEN EACH OF THE VARIOUS PORTS OF CUBA AND EACH OF THE VARIOUS PORTS OF THE UNITED STATES.

The comparative intercourse between the various ports of the United States and all the ports of Cuba is fairly illustrated in the following table, which, however, refers to a year during which the amount of intercourse was less than the usual annual average.

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*An official report of 744 foreign vessels sailing from Cuba to the United States during one year states that 367 of these were Spanish, 288 were British, and the remaining 89 belonged to ten other nationalities.

TABLE NO. 2.—*Statement of the total number of vessels, American and foreign, which entered each of the various* (26) *ports of the United States from all the ports of Cuba, during the year ending June* 30, 1878.

Name of ports.	Number of vessels.		
	Total.	American.	Foreign.
1. New York	910	701	209
2. Key West	265	234	31
3. Philadelphia	194	167	27
4. Boston and Charlestown	165	113	52
5. New Orleans	128	28	100
6. Baltimore	116	65	51
7. Pensacola	92	40	52
8. Charleston	76	13	63
9. Savannah	55	7	48
10. Pearl River, Mississippi	45	28	17
11. Mobile	34	17	17
12. Saluria, Tex	31	31	....
13. Wilmington, N. C	24	2	22
14. Brunswick	20	7	13
15. Saint Mary's	16	....	16
16. Fernandina	14	4	10
17. Portland and Falmouth	13	9	4
18. Galveston	12	3	9
19. Têche, La	10	10	....
20. Apalachicola	5	4	1
21. Saint Mark's	4	4	....
22. Saint John's	3	2	1
23. Brazos	1	1	....
24. Beaufort	1	1	....
25. Norfolk and Portsmouth	1	....	1
26. Stonington	1	1	....
Totals	2,236	1,492	744

It is noteworthy that of all the vessels cleared from Cuba to the United States four-fifths entered the six ports of New York, Key West, Philadelphia, Boston, New Orleans, and Baltimore—more than two-fifths of these having entered the port of New York alone, and less than two-fifths the remaining five ports combined—and that only 571 of the 2,236 vessels sailed to the eighteen southern ports which are south of Norfolk, Va., and especially liable to yellow fever.

Although Spain, the mother country, imposes from May 1 to October 1 severe quarantine restrictions on vessels from all Cuban ports, whether with or without clean bills of health, yet these ports are not all equally prone to infect the shipping in their harbors; and vessels which do become infected are not dangerous in equal degree to

TABLE No. 3.—*Total number of American vessels cleared from all and from each of ten Cuban ports for United States during the year ending December 31, 1878.*

Ports of the United States entered in 1878 by vessels cleared from ten specified Cuban ports.	Havana.	Matanzas.	Cardenas.	Sagua.	Cienfuegos.	Baracoa.	Caibarien.	Trinidad.	Cuba.	Nuevitas.	Totals from ten ports.
New York	160	166	144	77	57	114	40	1	7	1	767
Philadelphia and Delaware Breakwater	11	56	71	35	29		10	18	3	2	235
Key West and Cedar Keys	179	3	29	11	1		3				226
Boston and Charlestown	7	46	4	7	53	5	1	9	1		133
New Orleans and Southwest Pass	60	9	1	2	6		3				81
Baltimore	5	24	30	7			1				67
Indianola	31										31
Pensacola	14	4	8	1	2				1		30
Savannah	8		1						7		16
Pascagoula	10			1	2		2				15
Mobile	4	3		1							8
Charleston			1		1	8					10
Portland and Falmouth	1		2	2							5
North Hatteras											5
Morgan City	5					3			2		5
Pearl River Shieldsborough, Handsborough	1	2									3
Brunswick, Ga	2										2
Galveston	2										2
Apalachicola				2							2
Jacksonville					1						1
Fernandina	1										1
Cat Island	1										1
Brazos	1										1
United States for orders									1		1
Totals	503	313	291	146	152	130	60	28	22	3	1, 648

While this table correctly represents the *comparative* intercourse from the specified Cuban ports to the ports of the United States, it must not be forgotten that it inadequately represents the *absolute amount* of said intercourse, because it fails not only to report the fifty to seventy-five vessels which sail annually from five omitted ports, but also to report the seven hundred to eight hundred *foreign* vessels which also sail to the United States. In another particular, still more important, the table is calculated to mislead in any estimate of the number of dangerous risks incurred by the United States from any one of these ports when infected; for a number of vessels sail from each of the chief and most dangerous ports coastwise, and are reported in the table as sailing from its last port of departure, perhaps an uninfected one, without reference to the fact that it had previously been at a dangerously infected port. Some idea of the number of such risks may be derived from the following facts: From that most dangerous port Havana there sailed in 1878, *directly* to the United States, five hundred and three American vessels, as is correctly stated in the table, but in addition to this number there were one hundred and seventy-six other vessels which sailed coastwise from Havana; that is, to some other Cuban port. And these one hundred and seventy-six vessels are reported as cleared from their final port of departure, and not from Havana.

Medical records are full of instances where vessels, sailing from some other Cuban port, had become infected really at Havana. During the present year, two vessels at Matanzas were reported to have become infected at Havana, and one vessel entering Philadelphia from Sagua is reported to have become infected at Matanzas.

2.—DURING WHAT SEASONS OF THE YEAR IS THE INTERCOURSE FROM CUBAN PORT THE UNITED STATES GREATEST AND LEAST.

Of the 1,648 American vessels which sailed from the ten ports of Cuba during year ending December 31, 1878, the number which sailed during each of the f quarters of the year was as follows:

TABLE NO. 4.

Cuban ports.	Total No. vessels during year.	No. vessels first quarter.	Second quarter.	Third quarter.	Fourth quarter.
Havana	503	109	133	133	
Matanzas	313	67	148	68	
Cardenas	291	55	144	69	
Sagua	146	14	55	51	
Cienfuegos	152	34	58	42	
Baracoa	130	23	77	16	
Caibarien	60	6	23	15	
Trinidad	28	8	10	7	
Cuba	22	12	3	3	
Nuevitas	3	1	1	....	
Totals	1,648	329	652	404	

During the year 1877 the corresponding figures were as follows: Of 1,454 Americ vessels 414 sailed during the first quarter, 548 during the second, 264 during the thir and 228 during the fourth quarter. It thus appears that a larger number of vesse sail from Cuba to the United States during the six months, April to October, th during the six months from October to April. It deserves notice that the large amount of intercourse with Cuba occurs during the second quarter of the year, b that positive information was received that this excess occurred more especially duri the months of April and May, and not usually in June. Since the four months Jun July, August, and September are especially to be feared, and since it is during th period that the greatest conflict occurs between sanitary and commercial interests, was deemed important to determine what proportion of our trade was carried on durin these months. It is regretted that the desired data were not obtained except for th ports of Matanzas and Cardenas, but no reason is known why the facts as to these tw should not correctly indicate the facts as to the other ports. The facts as to Matanz and Cardenas are as follows:

TABLE NO. 5.—*Statement, for five years, of the number of vessels of all nationalities whi cleared annually for the United States from the ports of Matanzas and Cardenas during t four months June to September, and during the whole year.*

Ports.	1874.		1875.		1876.		1877.		1878.		Totals f five year	
	For the four months.	For the twelve months.	For the four months.	For the twelve months.	For the four months.	For the twelve months.	For the four months.	For the twelve months.	For the four months.	For the twelve months.	For the four months of the five years.	For the five years.
Matanzas	100	529	136	514	61	418	78	357	145	425	520	2, 24
Cardenas	58	405	89	445	59	394	79	297	126	350	411	1, 79
Totals	158	934	225	959	120	812	157	654	271	775	931	4, 03

Thus it is seen that considerably less than one-fourth of all the vessels which sail t the United States from Matanzas and Cardenas habitually sail during the four months June to September.

3. WHAT IS THE VALUE TO THE UNITED STATES OF THE INTERCOURSE WITH THE PORTS OF CUBA?

The day may come when the people of the United States will demand whether their welfare would not be best promoted by suspension of intercourse with Cuba during certain months of the year; the day has come when this intercourse is much restricted; and the day is always at hand when an intelligent people should be instructed to what extent their pecuniary as well as their sanitary progress is involved in every legislative measure. Commercial interests are so much prized, sanitary interests so ill-appreciated, that vague and absurdly exaggerated statements of the value of the Cuban trade find credence.

In January, 1879, an intelligent but interested witness testified before a committee of distinguished Congressmen and of medical experts engaged in the investigation of the yellow fever epidemic of 1878, that the sanitary restrictions on the trade of New Orleans with the West Indies had, during this one year, injured that city to the extent of about one hundred millions of dollars. It is instructive that this evidence passed unquestioned in spite of the fact that the total annual exports of Cuba *to all nations* has rarely if ever exceeded that sum.

The most complete and reliable data in hand are for the year ending June 30, 1878, and some few of these data are submitted with the warning that all the figures for this year are somewhat less than the usual annual averages of recent years, owing to the less productiveness of this year.

The total exports of Cuba in 1878 were $70,881,552, and of this sum there were $56,665,278 of saccharine products and $13,213,690 of tobacco.

The United States took from Cuba $58,885,162 of its exports (or deducting "specie," $56,901,332 of Cuban products), and exported to Cuba, exclusive of "coin and bullion," $11,365,013 "merchandise." Thus the total trade with Cuba in 1878, *not the profits on this trade*, which must necessarily have been very much less, consisted in the interchange of products and merchandise of which the total value was only $70,250,125, while the annual average for the past ten years has not been more than about $80,000,000.

This trade, in 1878, was distributed as follows:

TABLE NO. 6.

	Imports.	Exports.	Total.
New York	$44, 530, 355	$7, 469, 977	$52, 000, 332
Philadelphia	4, 915, 311	1, 065, 893	5, 981, 204
Boston and Charleston	4, 559, 228	178, 187	4, 737, 415
New Orleans	2, 043, 697	188, 813	2, 232, 510
Baltimore	1, 917, 597	135, 754	2, 053, 351
Key West	664, 292	626, 624	1, 290, 916
Portland and Falmouth	209, 038	767, 077	976, 115
Saluria, Texas	....	379, 951	379, 951
Pensacola	2, 320	109, 149	111, 469
	58, 841, 838	10, 921, 425	69, 763, 263

The insignificant remainder ($486,862) of this trade was transacted with the ten southern ports which follow in the order of their relative importance: Pearl River ([illegible]2,667), Mobile, Galveston, Savannah, Wilmington, Charleston, Brunswick, Saint Marks, Fernandina, and Brazos, ($10,056).

So many intricate problems enter into the calculation of the profits derived from commerce that even commercial experts would find it difficult to estimate the value to this country of its trade with Cuba, and still more difficult to estimate the much smaller profits which would be lost to the United States by a suspension of or by restrictions on this trade during a few months of each year.

None the less, the facts given seem to justify the following concusions: The United States is an indispensable market to Cuba. Suspension of intercourse during a few months would tend to force the Cuban trade into the remaining months of the year rather than to seriously diminish this trade. The chief injury to the interests of the United States would fall upon the shipping and sailors temporarily deprived of occupation, and finally, present sanitary restrictions on this trade certainly do not cause to the United States the great pecuniary loss which the people are incessantly taught is thereby inflicted.

II.

ENDEMICITY OF YELLOW FEVER IN CUBA.

The vagueness of significance attached to the words *endemic* and *epidemic*, whether as defined by medical lexicographers or by common use, renders these words so unsatisfactory that whoever would write with accuracy is forced to explain. As usually defined, an endemic disease is due to a local cause, and is peculiar to certain locali or countries wherein it prevails habitually; but this habitual prevalence need no persistent throughout every month of the year, nor even during every year. T this word ranges through undefined limits, so that when an endemic prevails w great severity custom permits it to be termed either an epidemic or an endemo- demic. A greater objection to the word is found in defining it to be "due to l cause." What is due? Is it the *origin* or the *propagation* of a disease by local ca which entitles it to be classed as an endemic? While all admit that the local ca have much to do with the *propagation* of yellow fever, it is very doubtful whether t disease has its *origin* any more in such causes than have the eggs of a tape-worm, achorion of the barber's itch, or the virus of small-pox, or syphilis. Just as sugar-c is *propagated* only when under the influence of certain local causes, but can never *originated* by them, so many hold as to the origin and propagation of yellow fe Hence, the word endemic will not be used to imply that either this or any other dise which there may be occasion to thus designate owes its *origin* necessarily to local cau

In reference to the endemicity of yellow fever in Cuba, its history, extent, a causes in many different localities thereof, so vast a mass of valuable statistical a other facts has been gathered that it is impossible to condense these into a brief p liminary report, and the difficulty of properly treating the subject is greatly increa by the fact that so much time was engrossed in collecting these facts that very lit has been left for their thorough study and proper mental digestion. As this holds, some measure, true in reference to all of the special subjects investigated, genera ties, rather than details, must be permitted.

The endemicity of yellow fever is so intimately associated with its first appearan its history, and its causation that a few facts must be presented, not only on the h tory of yellow fever in Cuba, but also on the history of this disease prior to the y 1761, when it first appeared in Havana,* so far as its first distinct recognition and a thentic record go to establish this first appearance.

The history of yellow fever prior to 1761 requires to be divided, for present pur ses, into two epochs: first, from the discovery of America in 1492 to 1640, and, seco from 1640 to 1761. A third epoch, from 1771 to 1780, will be subsequently consider in relation exclusively to Cuba. Those familiar with the history of general literatu and especially of medical science from 1492 to the present day, need not be remind through what an abyss of illiteracy, medical ignorance, and quackery civilized natio have slowly progressed to the present day; and that only in recent times have the been ample means to publish, and any considerable number of medical men comp tent to observe and to record what was worthy of publication. Hence none should surprised that, though the records of yellow fever are superabundant in mode times, these records should become less and less satisfactory until, as we pass backwar we reach an epoch, as is that from 1492 to 1640, of vague allusions and inconclusi descriptions—therefore an epoch open to suspicion and hypothesis.

1492 to 1640.—Historical records justify the suspicion that yellow fever prevailed San Domingo in 1493–1494 and subsequent years, in Port Rico as early as 1508, Darien in 1514, in Guadaloupe in 1635, &c. Knowledge of nature's laws, of disease, yellow fever particularly, and of other subjects relating to the present topic, conve the suspicion justified by scanty historical records into an absolute conviction th yellow fever was at least coeval in some of the West Indies with their first settleme by Europeans.

1640 to 1761.—Nothwithstanding this conviction the earliest authentic historic notices of unquestionable yellow fever are those which record epidemics of this di ease at Guadaloupe in 1640, Martinique in 1641, and Barbadoes in 1647. Memoran are in hand which indicate the prevalence of yellow fever from 1640 to its first recor ed appearance in Havana in 1761, in not less than thirty different places, more tha one hundred times; and among these in not less than ten different places nearly fif different times in these United States.

YELLOW FEVER IN HAVANA AND CUBA, FROM 1761 TO 1880.

The year 1762 was a notable one to Havana, since it was besieged, captured, an held by an English force of some thirty thousand soldiers and sailors for more than year. In that year a yellow-fever epidemic committed destructive ravages, and it not singular that many historians should have committed the apparantly inconseque error of stating that the disease first appeared in this notable year. However, ampl historical proofs have been secured to establish that the first epidemic occurred i 1761, and the second in 1762.

Although the disease made its first historical appearance in 1761, yet there are hi torical allusions sufficient to justify strong belief that yellow fever had existed i Havana and Cuba in four of the eight years 1648 to 1655. However, in view of thi suspicion, it deserves notice that, though Spanish literature is unusually rich in valu all histories of Cuba, no allusion has been found justifying even a suspicion that yellow fever was known in the island from 1655 to 1761. On the contrary, repeated references are made to the remarkable salubrity of Havana, and to the non-existence of any exceptional or devastating diseases during this interval. While such references cannot be accepted as absolute proof, they yet tend to show that if the disease did exist from 1655 to 1761, it could not have prevailed either habitually or severely.*

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*Havana was founded in 1515–1519; had a population in 1600 of about 3,000, in 1700 about 9,000, an in 1792 about 50,000.

Convincing historical evidence has also been secured that since 1761 yellow fever has been persistently endemic in Havana, present every year from then to the present time. Reference to any medical authorities on the geographical history of yellow fever will show records of the occurrence of this disease in certain specified years, interrupted by intervals of unrecorded years; thus leading to the false inference that the disease did not prevail during those unrecorded years. On this subject all of these authorities dangerously mislead the profession; for the truth is now, as it has always been since 1761, that yellow fever prevails in Havana every year without exception, and that the years specially recorded were simply years when the disease prevailed to somewhat greater extent than during the intervening years, which these authorities omit to record.

IN WHAT PLACES AND TO WHAT EXTENT DOES YELLOW FEVER PREVAIL IN CUBA.

Reports have been secured from twenty seaboard towns, including "the ports of entry," and from more than twenty of the chief inland towns; these record the facts for both the civil and the military population, but they include so wide a field and so many instructive details that it is impossible to state at present any more than general results.

The most general result is that yellow fever habitually prevails in every place in Cuba from which reports were received, provided these places are of any size or commercial importance and contain any considerable number of unacclimated persons to furnish food for the wide-spread poison.

In this particular, also, medical authorities, as well as intelligent residents of Cuba, have for the most part misled the profession. Before leaving the United States the most absolute assurances were given by natives or ex-residents of Cuba, and even in Cuba itself these assurances were confidently repeated, that yellow fever never occurred in this, that, or the other place. Diligent inquiry was made for all such accessible places, and diligent investigation invariably proved that these assurances were false, and that they were founded upon a *comparatively slight prevalence* of the disease, due in large measure to the small number of unacclimated visitors or residents at such places. Detailed proofs of these facts are possessed in abundance. It is very certain that the prevalence of yellow fever is not equally marked in all places. This varies greatly in different places and in different years at the same place; and this variation is, at times, independent, apparently, of the amount of unacclimated material.

While the records of all recorded places cannot now be given, nor the records in full of any one of the forty-odd places, the following facts, derived from the statistics of the military hospitals (which begin with the year 1851), give some proofs of the endemicity of yellow fever at fourteen of the fifteen "ports of entry," Taza being omitted because too insignificant to require a hospital. They will be considered in alphabetical order: and it must be remembered that, because in certain years no cases of yellow fever are reported in the military hospitals, this does not prove that the civil population was also exempt, and very probably was due to the absence during said time of unacclimated soldiers:

1. *Baracoa.*—There were cases of yellow fever in the military hospital every year since 1865, except from February, 1873, to May, 1876.
2. *Caibarien*, an insignificant village, and the seaport of Remedios, about five miles distant.—Yellow fever occurred in the hospital of Remedios every year since 1867, except in 1873.
3. *Cardenas.*—The records extend only from 1853 until 1871. Yellow fever occurred in every year except in 1856. Other evidence proves the annual presence of yellow fever for many past years. In 1879 the disease is reported to have been worse than ever before.
4. *Cienfuegos.*—Yellow fever every year since 1850, except in 1862 and 1874. In 1879 there were very few cases.
5. *Cuba (Santiago de).*—Yellow fever prevailed every year, and nearly every month, from 1850 to the present time.
6. *Gibara or Jibara.*—Yellow fever occurred every year since 1868; also for the same time at Holguin, the inland town of which it is the port.
7. *Guatanamo.*—Yellow fever every year since 1866.
8. *Havana.*—Yellow fever every year and every month since 1850.

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*Since the first appearance of yellow fever in some of the West Indies has been attributed, by some few writers, to the first importation of negroes, it is worth recording that "the first three hundred African slaves were brought from San Domingo to Cuba in 1523"; that in 1763 several thousand were introduced; and that in 1774, when the first census of Cuba was taken, there were in the island 75,180 colored population, of whom 44,333 were slaves.

9. *Manzanillo.*—Yellow fever every year since 1866.

10. *Matanzas.*—Yellow fever every year since 1856, except in 1866. The disease was severe in 1878, and greatly affected the shipping, while in 1879 the disease has not been severe either on the shore or in the harbor. Other evidence proves that for very many years yellow fever has prevailed annually in Matanzas.

11. *Nuevitas.*—Yellow fever every year since 1868. This is the northern port of the far inland and comparatively elevated city of Puerto Principe, which various authorities record as free from yellow fever, and as to which several physicians in Havana asserted in 1879 that it had never had yellow fever until the insurrection (1868–1878) caused an ingress of troops. The military records prove the existence and considerable prevalence of the disease in Puerto Principe every year since 1850, except in 1866.

12. *Sagua.*—Yellow fever occurred in 1869, 1870, 1871, and this hospital was suppressed in 1873. Yellow fever is endemic, but not usually very prevalent, at Sagua, as proved by other evidence.

13. *Santa Cruz.*—Every year since 1868, except in 1876 and 1878.

14. *Trinidad.*—Every year since 1853, except in 1863.

It will of course be understood that while cases of yellow fever occurred during the years above reported, yet that the number of cases during said years varied greatly; there having been in some few of these years perhaps only one case in some one of the military hospitals.

At Havana the yellow fever endemicity is most marked; indeed it would not convey a false idea to state that the disease is generally epidemic from June to October, and endemic during the remaining months of the year. This statement is illustrated by the following facts in reference to the past ten years—1870–1879.

During this period the minimum and maximum number of deaths which yellow fever caused during each month will be stated, reminding the reader that the number of deaths imply about treble said number of cases.

TABLE NO. 7.—*Monthly maximum and minimum deaths by yellow fever in Havnaa during the ten years* 1870–9.

Months.	Minimum.	Maximum.
January	6	32
February	4	24
March	4	32
April	4	37
May	13	103
June	66	378
July	68	675
August	70	416
September	35	234
October	28	185
November	5	150
December	9	82

In no one of the ten years 1870–1879 have there ever been fewer deaths than in the first nor more than in the second column, and the total deaths by yellow fever for each year were as follows:

TABLE NO. 8.—*Total deaths by yellow fever in Havana.*

In 1870	665
In 1871	991
In 1872	515
In 1873	1,244
In 1874	1,425
In 1875	1,001
In 1876	1,619
In 1877	1,374
In 1878	1,559
In 1879, to October 1	1,353

From one-fourth to one-half of these deaths occur in the military hospital, an important fact, which, in connection with many others, proves how erroneous is the idea that yellow fever is especially and exceptionally severe in the shipping and harbor of Havana.

It is believed that the above selection of a very few from the very many facts collected will suffice for the present to illustrate the endemicity of yellow fever in the most important seaports of Cuba. Residents of the mountains and of other secluded rural portions of Cuba suffer with the disease when visiting infected towns, and this fact serves to prove that the poison has no such permanent lodgment in these places as to require to acclimatize a population and also that the causation of the disease must be sought for in other conditions than those common to these rural places and to the towns habitually infected.

III.

THE CAUSES OF THIS ENDEMICITY.

Yellow fever was not endemic in Havana prior to 1761, yet before this time the geography, geology, and meteorology of Havana were what they continue to be.

In 1805 Mr. Hill, United States consul at Havana, reported, "It is from June to November that yellow fever is most prevalent and fatal. Indeed it is seldom known at any other season." It is now and has long been well known to be present every month of every year.

If such high authorities as Dutroulau, Cornillac, Béranger-Féraud (and there are none higher in yellow-fever literature) are to be credited in their statements of facts, then this disease is occasionally epidemic, but not persistently endemic in any of the Lesser Antilles (prevailing in Martinique, Guadaloupe, Trinidad, &c.) in the same epidemic manner it does in portions of the United States, and not in the endemic manner characteristic of Cuba, and especially of Havana.

Thus, then, it appears that the prevalence of yellow fever in Havana during certain months only has so increased that the disease is present every month, and that the causes must be sought in conditions other than those which existed there prior to 1761, and which still exist in certain rural localities of Cuba and throughout most of the other West India Islands.

What are these different conditions? History records that "previous to 1792 Cuba had no commerce, the country lived by smuggling," and that "in 1818 the port of Havana, in common with the others of the island, was by law opened to foreign commerce."

Steam navigation, introduced in 1819, has gradually increased the intercourse between Havana and the principal ports of Cuba, while in 1848 their intercourse with other countries began to be increased by steamship lines.

From 1836 to 1863 nearly a thousand miles of railroad were constructed, linking the chief seaports more closely, not only with each other, but also with the chief inland towns, and during the insurrection of 1868 to 1878 the introduction of unacclimated persons was unusally great, as was their intercourse between Havana and other infected ports on the one hand and inland towns on the other. With these various events the prevalence of yellow fever has apparently increased. Cuba differs from the Lesser Antilles in that its products are more valuable; therefore its commerce by land as by sea is more extensive, and its population, unacclimated and acclimated, is more numerous and aggregated more densely in cities, which are in frequent and rapid intercourse with each other.

In addition, Cuba makes no such efforts to limit the spread of yellow fever as have been apparently so successful in Martinique and other West Indies. Its military as well as its civil hospitals, its official as well as unofficial physicians, register yellow fever in their records and in their certificates side by side with small-pox as a "*contagious disease*," and while many of its most eminent physicians deny that the disease is contagious from person to person, no one of these was encountered who did not advocate that the disease was portable and could be spread by importation. Notwithstanding all this, so far is Cuba from efforts to control the propagation of yellow fever that much is done which is calculated to greatly favor this. Three illustrations will be given.

(*a*) In July, 1879, the chief military hospital at Havana, located on the edge of the harbor in one of the notoriously most infected wards and localities of the city, was inspected. It contained many cases of yellow fever, some of which were originating therein daily. A large room on the ground floor of this hospital contained new blankets and other hospital supplies of clothing in very large quantities, and to the value of $60,000, and it was found that these supplies were for *distribution* to the other military hospitals scattered over the island.

(*b*) Cuba has for years been cursed with a deteriorated paper currency, much of it so dirty that it stinks, and some of it so foul that it has been seen conveying even sticking fish scales from person to person.

(*c*) After October 4, 1879, although there had been during the week twenty deaths in Havana, with not less than eighty cases of yellow fever existing on that day, and in the harbor nine infected vessels, yet "clean bills of health" were issued by Cuban officials to vessels sailing from that harbor.

These three instances will suffice to compare Spanish practice with the theory of Spanish law and of Spanish medical officials, and also to show that if these theories of yellow fever be correct, then the exceptional prevalence of yellow fever in Cuba, as well as its importation thence to foreign countries, needs little further explanation. Having the poison, all the requisite climatic conditions for its propagation, and constant supplies of unacclimated food for the poison, ample means are provided to bring the one into contact with the other.

In connection with the facts stated, it is pertinent to add that small-pox has also become endemic in Cuba, and especially in Havana, where cases occur every month, so that the annual mortality *during the past nine years*, 1870-1878, has been as follows: 618, 1,126, 174, 47, 772, 711, 160, 97, 1,225. Now, this small-pox mortality is chi in the civil population, and if the mortality by yellow fever in the same populat were compared with the former, it would probably be found that small-pox is as ceptional and almost as severely prevalent as is yellow fever.

Further, it should not be forgotten that while none of the causes referred to suf to always explain all the variations in the prevalence of yellow fever during cert seasons and years, yet that this *terra incognita* of this disease is also a *terra incognita* small-pox, of malaria, and of other diseases. Science has no right to expect expla tions of the mysteries of the one, while still unable to solve the similar mysteries other much more familiar and widely prevalent diseases.

The whole truth has very certainly not been fathomed; but this much of it is disputable: Wherever in Cuba a town exists which has the greatest commercial tercourse, the most numerous unacclimated population, the least exposure to winds, and houses the most crowded together, densely inhabited and filthy, the wo ventilated and drained, there a town will be found wherein the endemic prevalence yellow fever is most marked.

REMARKS ON CLIMATE IN CONNECTION WITH THE PREVALENCE OF YELLOW FEV

The commission is in possession of the meteorological records of Havana twenty years, recorded in the metrical system, and occupying hundreds of print pages. It has, in addition, records for one or more years of several other places, fact for all of the few places which have such records.

From these records an expert in meteorology may possibly be able to add to o present knowledge. In the meantime, a few facts in reference to a subject which concede has an essential connection with yellow fever seems imperatively called in any consideration of the causation of the endemicity of this disease.

1. *Temperature.*—The "annual mean" is conceded to be the factor of greatest m ment in this connection. This, in Havana, varies in different years from 77° Fah. 79°. The mean temperature of the hottest month varies from 82° to 84°.5, and the coldest month from 72° to 75°.7. While the minimum temperature is rarely low as 50°, the maximum is rarely 100°. There are no records nor any recollecti of frost having ever occurred, except on December 24 and 25, 1856. This, of cours has no reference to the sparsely inhabited mountains, some of which attain in t eastern end of the island an altitude of more than 8,000 feet.

Notwithstanding the unquestioned influence of heat, yellow fever is by no mea always most prevalent when this is greatest. From Cuba to Guiana the disease h repeatedly prevailed with little severity during the hottest summers, and with gre severity during the winter.

2. *Rains and moisture.*—The average annual rain-fall is about 50 inches, and t number of rainy days 102. There is no reason to believe that in any warm clima where there is abundance of water to evaporate there can ever be a lack of as muc atmospheric moisture* as the yellow-fever poison probably does require. Dutroula asserts as to Martinique, "often after and during the driest season yellow fever h committed its greatest ravages." The same fact has been observed in other places.

3. *Winds.*—No connection has ever been established between the prevalence of ye low fever and the prevalence of the wind from any special quarter. While there evidence that violent winds, storms, or hurricanes exercise an unfavorable influenc on those dangerously sick with yellow fever, there is evidence fully as convincin that such winds tend, as any currents of uninfected air must tend, to dilute th poison, thus to diminish its activity, and thereby to reduce the number of case attacked.

4. *Electricity.*—Repeatedly, as in New Orleans and the South in 1878, violent epi demics have been attributed to the absence of electrical storms, and to a dimunitio of the quantity of electricity in the air; probably even oftener the reverse has bee maintained, especially in Vera Cruz and in the West Indies.

5. *Magnetism.*—For a series of years the College of Belen in Havana kept a recor of the variations of terrestrial magnetism. In 1868 Dr. Poggio, of the military hos pital in Havana, made a careful comparison, day by day, of the variations in bot yellow fever and terrestrial magnetism. "The result of a very careful investigatio was total disappointment."

6. *Ozone.*—In the severe epidemic from October, 1862, to February, 1863, at Sant Cruz, in the Canary Islands, ozonometrical observations were made, which tended t show an increase of ozone as the epidemic declined; and Dr. Fuzier, chief of th French military hospital at Vera Cruz, 1861-1865, also testifies to having "proved th feeble quantity of ozone in places which yellow fever prefers"; but until the chemical tests for ozone are more satisfactory, and such observations are repeatedly confirmed, science must maintain its skepticism.

7. *Alkalinity of the air.*—Dr. Carlos Finlay, a chemist and distinguished physician of Havana, claims to have discovered an important correspondence between the

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* The annual mean "relative humidity" varies in different years from about 73 to 74.3, and that of *different months of the year from 66 to 79.*

prevalence of yellow fever and the varying degree of alkalinity of the air at Havana and several adjacent places. This subject will hereafter receive the special attention of a member of this commission.

In fine, science has thus far failed to prove the essential connection with yellow fever of *any one* meteorological factor, except heat; and what duration and degree of this are requisite is very indefinitely known. It should, however, not be forgotten that this indefiniteness of knowledge is by no means limited to yellow fever, but applies to other diseases, as also to the varying crops of vegetables and the annually varying productiveness of animal life. Some of the most thoughtful students of yellow fever, while conceding that no one meteorological factor suffices to account for the propagation of the disease, are yet very firmly convinced that there is some undetermined combination of these factors which is essential. This conviction is based on the fact that in places where yellow fever frequently prevails as an epidemic there had been repeatedly present, without giving rise to an epidemic, a combination of the three factors most usual and important, namely, the presence of the poison, as proved by cases of the disease, an ample supply of unacclimated persons, and a persistence of apparently the very same insanitary local conditions observed during seasons when the disease was epidemic.

It will be very difficult, if not impossible, to determine what may be this supposed meteorological combination until vital statistics have so greatly improved that the influence of all other distributing causes, such as the varying number of the unacclimated exposed to the poison, the quality as well as quantity of the insanitary conditions, &c., can be rigidly eliminated from the problem. Finally, it should not be overlooked that climatic conditions may exercise a two-fold influence, one favorable to the poison, the other favorable to preparing the individual for its reception.

IV.

THE INSANITARY CONDITION OF THE PORTS OF CUBA AND THE CAUSES THEREOF.

This subject will be illustrated sufficiently for present purposes by the consideration of the four principal ports, Havana, Matanzas, Cardenas, and Cienfuegos, and especially of the first. No facts have been procured as to other ports indicating that their connection differs from these four in any important particulars.

The actual sanitary condition of every place is best tested by its annual death-rate, which necessitates for its calculation the number of the population and the number of the deaths which occur every year in this population. In Cuba it is unusually difficult to procure these data. The last trustworthy official census published was for the year 1862 (sometimes designated the census of 1861, also of 1863), and a copy of this could not be procured until a short time before the commission's departure from Havana. The more recent census of 1877 has not yet been published, and much delay and difficulty were encountered in obtaining from official sources a few insufficient, and at times discrepant, data in manuscript from this census. So much care is required in handling these data of population that errors are constantly committed by nearly all who treat the subject. Two frequent sources of error will be alluded to. One is the error due to such a fact as that there is a *district* of Matanzas, in the *city* of Matanzas, in the *municipality* of Matanzas, in the *jurisdiction* of Matanzas, in the *province* of Matanzas, and some who state the population of *Matanzas* mean one of these political divisions, while others mean another, and there is frequent omission to designate which division is meant. Another error is due to the failure, often unavoidable, to keep the civil apart from the military population.

Still greater difficulties are encountered in establishing the number of deaths which exactly correspond to any given population. The statistician is perplexed, not only by the confused mode of reporting dead civilians and soldiers variably intermingled, but also by the prevailing Cuban custom of reporting deaths by church parishes, which do not correspond with the political divisions in the census of the population. This Cuban habit of thus living politically and dying religiously is most vexatious to the statistician, if not to the moralist, and when considered in connection with other confusing perplexities, all recorded in the Spanish language, some idea may be formed of the care and labor required of one not conversant with this language to avoid being led astray. The following Statistical Table No. 9 has been compiled with such care that any errors which it may contain must be too trifling to invalidate the general results. But before proceeding to the examination of the mortality statistics of the four principal ports of Cuba, a few words by way of introduction will prove instructive in reference to the

DEATH-RATE OF CUBA.

Dr. Melero published in 1878 an able article on the vital statistics of Cuba, apparently to "show that the mortality in this island is not so great as represented by many, and that the climate is not as deadly as it has been believed to be." "It appears from these statistics that the death-rate in Cuba in 1827 was 26, in 1846, 24, and in 1861, 32 per 1,000 population." The three years mentioned are those of the most reliable official censuses.

TABLE No. 9.—*Statistics of the population, births, and deaths in four of the principal ports of Cuba for the years 1876, 1877, and 1878.*

Ports.*	Years.	Civil population, census of 1877.					Births or number of baptisms.			Deaths.			Death rate per 1,000 population.
		Whites.†	Colored.	Males.	Females.	Total.	Whites.	Colored.	Total.	Whites.	Colored.	Total.	
Havana‡	1876						3,562	1,333	4,895	5,290	2,148	7,438	
	1877	147,798	47,639	115,278	80,159	195,437	3,653	1,377	5,030	4,986	2,153	7,139	
	1878						3,665	1,310	4,975	5,996	2,598	8,594	43.9
Annual average of three years									4,967			‡7,724	39.5
Matanzas	1876									1,182	624	1,806	
	1877	27,643	9,504	20,348	16,799	37,147	1,106	420	1,526	1,066	467	1,533	
	1878						1,014	396	1,410	1,145	478	1,623	
Annual average of three years									1,468			1,654	44.5
Cardenas §	1876									736	322	1,058	
	1877	13,294	4,490	10,473	7,311	17,784	453	145	598	384	192	576	
	1878						410	147	557	282	189	471	
Annual average of three years									578			702	§39.4
Cienfuegos ‖	1876									1,374	322	1,696	
	1877	13,799	6,419	10,853	9,366	20,218	596	317	913	963	476	1,439	
	1878						539	386	925	661	273	934	46.2
Annual average of three years									918			1,356	‖67.0

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[*] In 1877 Havana had 17,259 houses for about 206,000 civil and military population; Matanzas had 4,710, Cardenas 2,289, and Cienfuegos 1,929 houses.

[†] Asiatics or Chinese are included in the "white" population, viz: 5,723 in Havana, 1,314 in Matanzas, 2,042 in Cardenas, and 609 in Cienfuegos. Asiatics were first introduced in 1847, and some 50,000 to 1873, about which date the importation ceased. There were about 22,000 in Cuba in 1877.

[‡] The reports, published in Havana, include in the annual deaths those of soldiers and sailors dying in the military hospitals; these deaths in the military population are excluded from this table; they were, 1,684 in 1876, 3,078 in 1877, and 2,913 in 1878.

[§] In Cardenas yellow fever was unusually severe in 1879, and there were 479 deaths by all diseases to August 30.

[‖] In Cienfuegos 1879 was an unusually healthy year, yet the deaths to September 1 were 496, which indicate an annual death rate of 37 per 1,000 population. The high death rate of 67 in the above table conveys an exaggerated idea of its unhealthfulness, because in 1876 and 1877, in fact from the date of the insurrection, 1868, Cienfuegos was frequented by many soldiers and refugees. It, however, has been found that its death rate during the five years, 1860-'64, averaged 50 per 1,000 of the 9,950 population of the census of 1862.

The vital statistics of these four and of other places in Cuba, for twenty or more years, are in the possession of the commission; and, in order to be sure that no injustice has been done them in the above table, the facts have been examined as to the last ten years, and the result is that the annual death-rate of all four places may be fairly stated to vary from about 40 to 50 per 1,000 population.

To the death-rates of these four principal ports the following may now be added. That distinguished Cuban statistician and invaluable friend to the commission, Dr. A. G. Del Valle, of Guanabacoa, states that the death-rate of Regla, immediately opposite to Havana, and absurdly represented by an American medical writer as one of the summer health resorts of the Havanese, was 50.13 in 1878; and that the death-rate of Guanabacoa, which suffers little with yellow fever, and is finely located on lofty hills some five miles to the east of Havana, was 38.72 in 1877, and 43.46 in 1878. Marianao, situated some six miles to the west of Havana, is the cleanest, most beautifully situated, and charming town seen in Cuba; it enjoys a great reputation for its salubrity and comparative exemption from yellow fever, and yet its death-rate in 1877 and 1878 was 40.

These facts suffice amply to prove what is the actual sanitary condition of the places mentioned. But sanitary science demands more than mere proofs of the bad condition of a place, and therefore much labor was expended in collecting facts to show what diseases chiefly contributed to this great mortality, and what were the insanitary evils acting as causes thereof. In considering these two subjects, Havana will be especially referred to. It will suffice to illustrate the essential facts in regard to all four ports.

The only procurable statistics of mortality by diseases mingle the military with the civil population, so that the total deaths in Havana for 1877, 1878, and 1879 averaged more than 10,000 per annum. The annual variations in this 10,000 mortality were chiefly due to variations in the number of deaths from small-pox; these varying from 97, in 1877, to 1,225 in 1878, and this disease caused during the eight years, 1871 to 1878, an average annual mortality of 539. More than seven-tenths of the annual mortality is caused by the following diseases:

TABLE No. 10.—*The chief diseases.*

Phthisis, about	1,700
Diarrhœa, dysentery, and cholera infantum, about	1,500
Yellow fever, about	1,500
Other fevers, chiefly malarial, about	600
Small-pox, about	550
Trismus nascentium, about	400
Meningitis, about	300
Pneumonia, about	300
Hepatic diseases, about	250
Total	7,100

During the past eight years, 1871 to 1878, the annual mortality by the diseases now to be mentioned ranged as follows: Measles, 0 to 28; scarlet fever, 1 to 6; diphtheria, 23 to 61, and typhoid fever, from 144 to 211. Farcy usually destroys about ten human beings annually, and leprosy so prevails, especially in the east of Cuba, that there are two, perhaps three, hospitals for this disease in the island—the one in Havana being occupied by nearly one hundred lepers, one-half of whom are Asiatics.

The above statistical facts abound in instructive suggestions and unsolved problems. The frightful mortality by phthisis is noteworthy, especially in connection with the fact that this mortality is excessive among the residents, and yet the consumptive invalids are still sent from the United States to Havana. The statistics of mortality by phthisis began in 1872, and in every year since then, without exception, the deaths by this disease exceeded those by yellow-fever. No fact could better illustrate the truth of Bowditch's law, and at the same time the truth taught by professional experience of the pernicious influence on this disease of foul air and other insanitary conditions, especially when combined with subsoil moisture. If these same conditions are the most potent factors in typhoid fever, or if it is a "filth disease," then it becomes inexplicable that this disease does not commit far greater ravages. Other fevers, probably malarial, contributed only about four hundred deaths to the annual mortality; but this represents very inadequately the widespread and destructive influence of swamp poison in Havana, and still less adequately in the other three ports, and generally in Cuba. It is believed that this poison, ever present, never inactive, inflicting far more injury by stealthily undermining and gradually destroying health than by sudden and fatal attacks, is even a worse foe than is yellow fever to Cuba. The extent of its influence is much better tested by the number of persons it attacks than by the number it directly kills. In one of the private infirmaries of Havana there was, in 1878, about one-third of nearly three thousand admissions due to this one poison alone.

In Matanzas, Cardenas, and Cienfuegos there is even more swamp poison than Havana. At every place visited the physicians testified that from one-third to thr fourths of all cases of sickness were due directly and solely to malarial poison, wh it complicated almost every case of all other diseases. One physician of great expe ence and distinction asserted that nothing more was needed to practice medicine su cessfully and prosperously in Cuba than to administer quinine with discretion.

In view of the grossly insanitary conditions which favor the great prevalence phthisis, of small-pox, of yellow fever, and of malaria, it is noteworthy that measles a scarlet fever play such an insignificant role in the mortality records. Diphtheria h at different times and places prevailed severely, and Dr. Mazarredo, a most intellige and distinguished physician, born and resident in Cienfuegos, testified most pos tively that it had never appeared in this place until after its appearance in Havar and until after the establishment of frequent and rapid intercourse between those t places.

CAUSES OF THE INSANITARY CONDITION OF HAVANA, ETC.

Nature has afflicted Cuba with swamps adjacent to the localities appropriat by man; has provided these places with a meager or inconvenient water-supply; h constructed the island, for the most part, of coral limestone or other porous, frial rocks, covered to only a slight depth with surface soil; and has located this fert island, so tempting to man's greed of gain, in a climate which favors to the utm decomposition, putrefaction, and the propagation of vegetable and animal life. M may hold nature directly responsible for any insanitary evils resulting from these co ditions, which, however, if history be true, failed during centuries to produce eith small-pox or yellow fever. But for insanitary conditions other than these man forced to consider to what extent he himself is responsible. Mankind in Cuba is no means exceptional in having not only neglected this responsibility, but also having, from ignorance and avarice, even abetted nature in its warfare against hi He imperatively needs an abundance of potable water, an unpolluted soil, and, abo even these, an unlimited supply of pure air. What has been done and left undone Havana to secure these requisites to healthy life?

1. WATER SUPPLY.

About four miles west of the entrance to the harbor of Havana the river Almendar empties into the sea. It is fed chiefly by springs, and the water is said by experts be good. Since about 1600 Havana has received its chief supply from this sma stream—first by means of the "Zanja," or water-course (in truth a ditch); second, 1835, by the "Aqueduct of Ferdinand VII"; and third by the "Aqueduct of the Vento or of Isabel II," which, begun in 1859, has cost more than $3,000,000, and will requi nearly as much more to complete. Although Havana now obtains its water throug all three of these channels, these fail to furnish it with a supply adequate, either i quantity or quality. The uncompleted "Aqueduct of Isabel II" is a monument of tl engineering skill of Colonel Albear, and if ever completed will furnish the city wit an ample supply of pure spring-water. From the point where completed as much this good water has been directed into the Aqueduct of Ferdinand VII as this ha capacity to carry. Since this is totally insufficient, the water of the Zanja is sti used, in whole or mixed in part with the other supply, throughout a large portio of the city. The water of the Zanja flows for some four miles through unprotecte mud-banks, the fluids from many houses drain into it, men and horses bathe, an dead bodies have been seen floating in it. In cannot be pure. But the impurity this supply of water to a portion of the population is an evil slight in comparison t that which results from the inadequate supply of water of any kind to the whol population. So costly and so inadequate is this supply that very few houses of th working class are provided with it, and a large portion of the population purchas their water daily in kegs and carboys from street-venders. This mode of obtainin water prevails in Matanzas, Cardenas, Cienfuegos, and many other places, and i most of these to even greater extent than in Havana.

The insanitary evils which result from this general insufficiency of water in a tropical climate are much greater than would ensue farther north. When bathing become difficult, and washing so exorbant that it costs from twenty to thirty cents in gold t have a gentleman's shirt washed, it is not strange that personal cleanliness should b so little attended to that an unusually large portion of the people are offensive to th smell. This lack of cleanliness extends within the houses, into the unpaved streets, the stables, markets, and for the most part everywhere. Farther details are useless, as also insistance upon the pollution of the soil and of the air and of other manifest evils, which necessarily result from an insufficient supply of water. It should neve be forgotten that "clean water adequately used is among the simplest, safest, best o antiseptics," and that the people of Havana and other cities are very insufficiently supplied with this antiseptic.

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* Springs which formerly emptied into the Almendares.

2. SOIL.

While a varying proportion of Havana, Matanzas, Cardenas, and Cienfuegos is built upon ground elevated from ten to one hundred feet above the level of the sea, another very considerable portion occupies the site of former mangrove swamps, which have been filled up, in large part, with the refuse and garbage from the streets. Swamps of this kind still lie contiguous to all of these cities. A very large proportion of the population live where the subsoil water is reached in from two to six feet of the surface, and it is very common to find privies wherein the contents rise and fall with the tide. In higher localities the thin surface soil and the foundation rocks* beneath it are extremely porous, and permit a high degree of saturation from the subsoil water, from the frequent and abundant rains, and from excrementitial fluids. So great is this saturation, and the defective structure of the houses, that a moisture-mark is found high up on the walls even of many houses located from fifty to one hundred feet above the sea.

As a general rule good drainage is found in no parts of these cities, except in the comparatively inextensive localities where nature has needed no assistance. One is often astounded by the impassable mud-holes, and by the green, slimy, stagnant water present in the streets and in the back yards of even a locality such as the Pueblo Nuevo ward of Havana, which is situated so admirably for good drainage that but little labor would be required to make it perfect.

A comparatively small number of the streets in the most densely populated portions of Havana have sewers, some of which empty into the harbor and others into the sea. A well-informed civil engineer testified that the sewers of only three streets subserved any good purpose, and that the remainder were so faulty that the city would be better off without them. Covered by grating having large interspaces, the dirt and refuse of the streets find such ready entrance that a number of these sewers were seen filled up with solid materials to within a few inches of the grating. Since very few houses are connected with these sewers they are the less offensive, but no one who has seen them can find any words, except of unhesitating condemnation, for their grossly defective structure. Etiologsits have repeatedly associated the causation of yellow fever with upturning of the earth, so that this is prohibited during the summer in some parts of the United States. If there be in Havana any such prohibition this was certainly not enforced during the summer of 1879.

4. AIR.

The facts just stated in regard to the water supply, and to the soil, are potent and incessant causes for pollution of the air. Among other such causes will be mentioned those which have connection with the streets and houses.

5. STREETS.

The older a Cuban city, or any part thereof, the narrower the streets. About one-fourth of the population of Havana live within the now demolished walls, and this "intramural" population possesses streets so narrow that on every corner is posted either "up" or "down," to indicate to all vehicles that they must pass only in the direction indicated. As time extended the city farther and farther beyond its walls the streets gradually became wider, until some attained the ordinary dimensions usually found in the United States. Matanzas, Cardenas, and Cienfuegos were founded subsequently to Havana, in the order mentioned; therefore Matanzas has many narrow streets, but not as narrow as Havana; Cardenas few, and Cienfuegos none. The narrower the streets the less well ventilated the houses thereon, and a large portion of Havana suffers severely from this cause.

About one-fourth of the population of Havana live on paved streets, which are as well paved and kept as clean, probably cleaner, than is usual in the United States. The remainder live on unpaved streets, which for the most part are very filthy, and not a few of them are, at times, impassable in a vehicle. Rough, muddy, or both, many of them serve admirably as permanent receptables for much decomposing animal and vegetable matter. In fine, more than half the population of Havana live on streets which are in a foully insanitary condition; but these streets, though so numerous, are not in the track of the pleasure tourist. In this capacity one of the members of this commission spent ten days in Havana in 1856, but never looked for, and therefore never saw, most of the evils which he now testifies to with emphasis.

6. HOUSES.

Four-story houses are the highest in Havana, and exceedingly rare; three-story houses are infrequent, and so few are the two-story houses that more than nine-tenths of all the houses were, in 1862, and are still, one-story houses. These one-story houses occupy very little space; they have no back yards, properly so called, but a court or

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* Specimens of these are in the possession of the National Board of Health.

narrow vacant space into which sleeping-rooms open at the side; in direct cont
with these are the kitchen, privy, and often the stables, which terminate this co
There are no storerooms, pantries, closets, or other conveniences for household suppl
but there are commonly four groceries on the corners of each square, from which t
supplies are procured at each meal. In Havana some of the floors, in Matanzas m
in Cardenas and Cienfuegos many, are of earth or of planks almost in contact with
wet soil. In Havana most of the floors are of brick or stone paving. Ventila
between the ground and the floor is almost unknown in Cuba. In every city mos
the floors are on a level with the sidewalks, and many are even lower than the le
of the streets. Most of the houses in Havana and many in other cities are of "m
posteria," * or rubble masonry, which is very porous and absorbs readily, as the w
moisture abundantly testifies. The roofs are of tile, and excellent. The ceilings
high, and the doors and windows are generally very large; but this is true rather for
front and rear of the main building than for the side rooms which open into the court,
are also occupied as sleeping apartments. The privy is almost a part of the kitch
it consists of an excavation which often extends several feet under the stone fla
the court; it is never emptied until it will hold no more, which seemed generall
be from five to ten years; it has no ventilating pipe, and belches forth its nause
odors at times even to the front door. Nothing more unwholesome and disgust
than the privies of Havana and of Cuba generally can be conceived. They are so
they cannot be worse. In juxtaposition with the privy is another excavation to
ceive the filthy refuse-water of the kitchen, laundry, and household generally,
police regulations prohibit the discharge of such water into the streets, except w
it is raining. This refuse-water is said to undergo a putrefaction which renders it
tolerably offensive. It notably aids the contents of the privy to saturate the
beneath the house. The kitchen is usually under the same open shed with the pri
and often in immediate contact with these is a stable. So near are horses kept
sleeping apartments that farcy would be more frequent than it is if the horses w
affected with it to a larger extent.

More cheerless and comfortless houses than those occupied by the working clas
and the people generally would be difficult to find. Since water is ill supplied
people are not more cleanly in their houses than in their persons. But as badly c
structed and kept as are their houses, rent is rendered very high, as are also food a
clothing, by taxation and by export as well as by import duties. As one illustration
this, when flour was $6 per barrel in the United States it cost in Havana $15.
Owing to such causes most workmen, even those receiving from $50 to $100 wages
month, live in such small tenement-houses as have been described. It is very rare fo
working man to have a house, however small and mean, for the exclusive use of hims
and family. He is forced to rent out every room, reserving for his own family o
perhaps two. The result is that these little houses, occupying an unusually insign
icant space of ground, are densely crowded; so that in every city the proportion
inhabitants to houses is enormous, especially when the diminutive size of these o
story houses is considered. The proportion of the civil and military population
the houses in Havana is nearly twelve to one.†

The condition of the houses has been poorly described if the description does n
account for the fact that in the summer season a fecal or urinary odor, due to m
or horses, prevails generally, and that in traversing the streets a musty, nauseous,
fecal odor is distinctly perceptible as it oozes from the doors and windows (whi
habitually open immediately on the streets) of almost every house. With time on
olfactory nerve becomes benumbed, and fails to give warning of the stench, if fai
of the privy and of the stable.

There has been no intention to convey the idea that houses may not be found
New York and other American cities as foul as they can be, and, therefore, as foul
they are found in Cuba; but in the former these evil conditions are seen as exce
tions, confined to narrow, disreputable limits, while in Havana these conditions
the "homes of the poor" are widespread and general. Moist, foul, stagnant air, co
fined low to the ground, is found everywhere, so everywhere can be seen the refu
of fruits and vegetable substances, furnishing abundant materials for decompositio
while numerous turkey-buzzards, roosting on the trees and house-tops of populo
cities, sufficiently testify to ample supplies for animal putrefaction. These gross i
sanitary evils are as abundant in Havana, where yellow fever always prevails, as
Canton and Bombay, where this disease never occurs.

There is one more subject which deserves brief notice in connection with air-pollu
ing causes and with theories maintained as to yellow fever. Sanitarians were greatl
offended by the burial of the dead of Havana in its churches until 1806, when th
"cemetery of Espada" was established outside the walls. In the course of years th
growing city surrounded this cemetery, and to this was again attributed, amon

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*Specimens are in possession of the National Board of Health.

†In the chief cities of the United States, excluding New York, the number of persons to the dwel
ing varies from about 5.5 to 8.5.

other insanitary evils, a bad influence on yellow fever. Overcrowded with more than three hundred thousand dead bodies it was closed in 1871, since when all the dead of Havana have been interred in the new "cemetery of Colon," which is admirably located and too distant from the population to exercise upon it any evil influence. It is noteworthy that there has apparently been no abatement in the prevalence of yellow fever.

7. THE HARBOR.

The beautiful harbor of Havana, adorned with surrounding hills which are surmounted by picturesque forts, and having diversified banks covered either with variously colored houses or with verdure encroaching upon the water, has three chief horns. It is three miles long from its entrance to the extreme limit of the most distant horn. The narrow entrance, some four hundred yards in width and twelve hundred in length, leads into the irregular bay, which may be said to average two-thirds of a mile in width and a little more than a mile in length. Its greatest depth is about thirty-six feet, but the anchorage ground for vessels drawing eighteen feet of water is very contracted, not exceeding one-half the size of the harbor. The number of vessels in this harbor in 1878 at any one time varied from forty-seven to two hundred and twenty-seven, and the average number exceeded one hundred, so that it is rare to see any one vessel more than a very few hundred feet distant either from another vessel or from the shore. The rise and fall of the tide does not exceed two feet, and the water is not otherwise replenished except by five or six little brooks, which are utterly insignificant except after a heavy rain.* Though pleasing to the eye, though sufficiently commodious and remarkably safe for shipping, this harbor is to the sanitarian little more than an almost stagnant pond or great cloaca into which is daily discharged the refuse—comparatively little of it being fecal—from more than one hundred thousand people with their domestic animals, all the filth from numerous vessels, the blood, offal, and other refuse from several hundred slaughtered animals, and the fecal as well as other refuse from the chief military hospital, and probably from other houses which are rarely without some cases of yellow fever. A considerable portion of the city drains into the sea, and it would be well if all of it did, but engineers pronounce this impracticable. Much of the eastern and southern shores are destitute of wharves; many of these, where they do exist, are dilapidated, worm-eaten, rotten, and all of them serve as traps for entangling the abundant filth poured into the harbor. All along the shore, as is usual in seaports, this filth is very apparent, and this is most offensively the case along the southern shore where the water is more stagnant than elsewhere; where the harbor is fast filling up, and where the adjacent land is low.

Notwithstanding these facts, the water of the harbor failed to present evidence, as elsewhere stated, of special putridity, nor did it during the summer of 1879 manifest the remarkable phosphorescence usual at this season, and for which it has long been particularly noted. Several high authorities in the literature of yellow fever associate the unwonted prevalence of this disease at Havana with the unwonted putridity and phosphorescence of the water of its harbor, and it deserves record that while the former was present in 1879 the latter was not. It is alleged that vessels of the British navy are forbidden to use this water on board for any purpose whatsoever.

On the eastern and southern shore there are some five depots for ballast, which is often deposited on the very edge of the harbor, with the lowest layer of the ballast in contact with the water, composed for the most part of friable porus rocks and the dusty detritus thereof, intermingled often with sand and earth, and the frequent recipient of human excrements. This ballast, all the materials of which freely absorb fluids and gases, should, in our present ignorance of yellow fever fomites, be treated as dangerous.† Ballast from places where yellow fever prevails has repeatedly given rise to justifiable suspicion that it was one of the agents for transplanting the poison.

The sanitarian cannot hesitate to advocate the cleansing of the harbor, the cessation of daily additions to it of large masses of filth, and the replenishment of it by constant currents of purer water. To accomplish the last, canals have been advocated in the United States, as well as in Cuba. For the present, a brief reference to this subject will suffice. Havana is by no means lacking in highly educated, skillful, practical engineers, fully alive to the sanitary interests of the city and to the merits of this special subject. Among these, Colonel Albear, who is at the head of his profession and vice-president of the Academy of Sciences, &c., read before this society in September, 1879, a paper on this subject, which will soon be published in Cuba. He is said to have demonstrated, conclusively, even to the advocates of these canals, that, even if constructed and at a necessarily enormous cost, they would altogether fail to accomplish any good purpose, and would tend, on the contrary, to aggravate present evils.

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* The so-called river of Luyano is properly classed among these insignificant brooks.

† Many specimens of ballast are in possession of the National Board of Health.

It has now been shown that the actual sanitary condition of Havana and o Cuban ports is very bad; that the water supply is, in part, defective in quality wholly insufficient in quantity, and that hygienic laws are so violated that m causes are in constant operation to grossly pollute the soil, the air, and the har We are now prepared to consider the next subject, first reminding the reader th violation of hygienic laws is prone to be followed by the worse results the war the climate and the denser the population—disastrous conditions, which appro their maxima in Havana.

V. *The means by which these insanitary conditions can be best made satisfactory.* 1 70–85.

VI. *The means which can and should be adopted to prevent the introduction of the caus yellow fever into the shipping at Cuban ports.* Pages 86–108.

V.

THE MEANS WHEREBY THE INSANITARY CONDITION OF CUBAN PORTS CAN BE B MADE SATISFACTORY.

To rectify the insanitary conditions of Havana and of other ports it is manifest t the causes thereof must be removed. Pure water must be supplied in unusual ab dance to the poor as well as to the rich; the swamps and lowlands must be drained a raised with rock and earth instead of with garbage; old sewers must be reconstruc and new sewers be constructed to diminish subsoil moisture and subserve all otl sanitary purposes which sanitation requires of them; the streets must be in la number widened, regraded, and so paved or repaired that they can be readily k clean; the houses must be in very large proportion torn down and reconstructed o different plan; the excavations for privies and for refuse water must be filled up a abandoned and a new system introduced; the stables must be removed, at least fr close proximity to sleeping apartments; the harbor and its shore must be cleans and kept so; and, finally, the filthy habits of the common people generally must reformed, and their ignorance of the means by which to protect themselves from dise must be fed with knowledge. To accomplish all this in Havana alone would requi millions of money; but these requisite millions expended in sanitary engineeri would correct these evils only in part. However, since the financial problem is a m important one some of its factors will be stated.

It is estimated by experts in such matters that the sanitary engineer would requi not less than $20,000,000 to correct some few of the most glaring insanitary evils such as have relation to the water supply, the drainage, the sewerage, the paving the streets, and to the harbor. Where is even this sum to come from? Spain, wi one-third of a much less prosperous population than has the United States, owes larger debt, on which she cannot pay even the annual interest. Our people co plain of the excessive national taxation imposed since 1861–'65; but Spain, by dire and indirect taxation, by onerous export as well as import duties, derives from tl 1,400,000 people of Cuba, exhausted by the insurrection of 1868–'78, more than si times as much revenue as the United States derives from an equal number of its pop lation. Thus, the government renders exorbitant house-rent (thereby causing ove crowding), food, clothing, and nearly all other necessaries to healthy life, and di courages the construction of more numerous and better houses, because these and a other evidences of increasing prosperity insure renewed exactions from the tax-co lector.

"Since 1868 the annual expenditures of Cuba have far exceeded the revenues, which even in time of peace are in greater part absorbed by the army and navy Besides its full share of this vast national or colonial burden, the city of Havan derives for its own support, from its 195,000 population, an additional $1,700,000 annu ally. Who, having a knowledge of these factors in the financial problem, can answe from whence is to come the many millions of dollars indispensable to render the insan itary conditions of Havana at all satisfactory?

Including the financial together with all other requisites to the end in view, th answer to the question "What can and should be done to render the insanitary con dition of Havana and other ports satisfactory?" must be the same as would apply unfortunately, to numerous other places within as well as without the United States The people must be provided with means to become intelligent, enlightened, especiall in hygiene, prosperous, and sufficiently numerous to eventually gain both the knowl edge and the power necessary to correct their insanitary evils. This is not only th best, but the only means. Until their accomplishment (which the present generatio will not live to witness) Havana will continue to be a source of constant danger t every vessel within its harbor, and to every southern port which these vessels ma sail to during the warm season.

While these are the conclusions of this commission, there were formerly many, and there are still some few, who, without personal experience or extensive knowledge of this special subject, look upon it in a much simpler light. They pronounce yellow fever "a nautical disease," and seem to believe that if means were adopted to rid ships and harbors of the poison generated, as is alleged, and contained in them, there would be an end of it. Since this view leads to practical results of great sanitary importance, the facts in the matter have been carefully examined in Cuba, and also the records of the facts in other of the West Indies.

1. ORIGIN OF YELLOW FEVER IN SHIPS AND HARBORS.

It may be premised that he whose knowledge of yellow fever is limited to its occurrence in any one place is an unsafe guide to general conclusions, and would be likely to improve these conclusions the more numerous the places included within his knowledge: that practitioners of medicine, obtaining their livelihood by their skill exclusively in the cure of disease, are by no means necessarily well instructed in the etiology and prevention of disease; and hence that far less deference is due to their authority than to that of those physicians who have studied yellow fever in many different places and have made its etiology and prevention their special study. Naval surgeons, and especially those among them charged with marine sanitation, are of all other medical men best entitled to credence and confidence in this matter. Evidence from two such French witnesses will first be submitted, one of these being A. F. Dutroulau, "premier médecin en chef de la marine," who had more than twenty years' personal experience of yellow fever, particularly in Martinique, and the other being Béranger-Férand, who held the same high post in the French navy, and also had extensive personal experience. Each of them was charged at different epochs with the duty of preventing yellow fever on ships and in seaports; and while surrounded for years by special opportunities for observation, was required by imperative official duty to study particularly the causation and prevention of yellow fever.

Dutroulau calls attention to the suggestive fact that the absence of an epidemic in endemic localities and the comparatively good sanitary condition of such places have been the chief facts which have misled those who advocate the origin of yellow fever on ships. He might have added, as additional sources of this erroneous theory, the failures to observe and to report whether vessels cited as convincing examples of local origin had ever been in any infected locality or had ever had on board any source of infection, and the ignoring of the length of time the poison may lie dormant and then renew its activity. In regard to this, though our knowledge is still very indefinite, it none the less can present may proofs of the great tenacity of the poison to a locality once infected and of the revivification of the poison after months of dormancy due to lowered temperature. Dutroulau also calls attention to the well-known fact that vessels employed in voyages to China and the East Indies, though subjected to prolonged tropical heat and the worst insanitary conditions, the identical causes assigned for the origin of the disease on ships in the West Indies have never been even accused of developing yellow fever on board.

Proceeding to facts of personal observation, Dutroulau testifies that after continued observations, dating from 1832, he was compelled to publish in 1851 that in *not one single instance* of many infected vessels did the disease originate on board. Subsequent special investigations from 1850 to 1857, as to all ships of war at Guyana and in the sea of the Antilles—of which ships a large number were infected—showed *not one* on which the disease originated spontaneously, or until after the vessel had anchored in an infected harbor. Asserting emphatically that ships get their infection from infected localities on the land, he adds that the opinion of the French naval surgeons, as expressed in their official reports, is *unanimous* on this point. Finally, he testifies that the better the anchorage of a vessel, the farther its distance from the shore and from centers of population and the more absolute its non-intercourse with the shore, the more completely is such vessel protected from yellow fever.

Béranger Féraud, though a distinguished ship-surgeon and the author of three able works on yellow fever, manifestly considers this alleged origin of the disease on ships so untenable, that in his last work of 1878 he does not deem it necessary to specially consider the subject. However, when referring to the means for protecting ships he says: "Ships should be prevented, as much as possible, from communicating with the land, for the greatest number of sailors attacked come from ships in the docks or are those who have most frequented the shore, while the ships most distant from the shore and from infected vessels escape." And it may here be added that the common experience of mariners in the ports of the West Indies teaches them specially to avoid the shore.

Dr. Fuzier, a French army surgeon in high official position during that most favorable period for observation, 1861 to 1865, when France occupied Mexico, and at that most favorable place for observation, Vera Cruz, denies absolutely the spontaneous origin of yellow fever on ships.

While such is the evidence derived from the highest French authorities, the experience in the Spanish navy is not less emphatic. Dr. De Caneda, a distinguished medical officer of this navy, long stationed in Havana, and president of the yellow-feve commission appointed by the Governor-General of Cuba to aid this commission, incidentally wrote, August, 1879, in an interesting report, not on this special subject: "I is frequently observed that the first cases on board ships of the Spanish squadron ar of those persons whose duty calls them oftenest to the shore." Dr. De Caneda appointed Surgeons Goler, Medina, and San Roman from the naval sanitary corps a Havana as a special commission to report on the questions propounded by Dr. Chaillé president of the United States commission. Their valuable report contains the following: This commission "is of the opinion that of the individuals of the navy stationed in Havana, those most liable to contract yellow fever are those who inhabi the arsenal and who frequent the wharves;" "the farther the vessels are anchore from the wharves the less their danger of being attacked by yellow fever;" and th members regret they have not sufficient time to collect statistical facts in detail "t demonstrate beyond question the truths stated, and derived from their personal experience and judgment."

Fortunately that able and zealous officer of the United States Dr. D. M. Burgess who had been earlier notified of the report desired by this commission, was enabled to collect statistical facts in detail and to present a very valuable tabular statement of these facts. The publication of this table is reserved for the final report, but the interesting letter which accompanies the table instructively summarizes the results, and will be presented in full after one necessary explanation. Dr. Burgess, as well as this commission, designates a vessel having one or more cases of yellow fever on board "infected," but both parties are well aware that while such a vessel should be regarded in practice as infected, yet it cannot, with rigid scientific accuracy, be so proved, unless cases have been developed on board within the time—say six days—since those attacked had opportunity to become infected by some place, thing, or person outside the vessel.

"No. 2 Tacon Street, Havana, Cuba, *October* 4, 1879.

"Stanford E. Chaillé, M. D.,
"*President of the Havana Yellow Fever Commission, &c.:*

"Dear Sir: Your communication soliciting answers to the following questions in regard to the infection of vessels by yellow fever while lying in the harbor of Havana is received. In reply I would say that since definite statistical data are very much wanting on this subject, more credence is asked for personal experience and observation than would be otherwise desirable.

"First question: '*Which vessels are more apt to be infected, those at wharves or those at anchor?*'

"Twelve years of constant professional intercourse with, and observation of, shipping while lying in this harbor convince me beyond all question that those vessels which lie at wharves suffer incomparably the most. Even in winter, when no cases of the disease can be found on vessels anchored in the open bay, and which do not permit their crews to go ashore, it is not at all unusual to find that vessels lying at wharves are invaded by the disease. In the summer months vessels which discharge at wharves nearly all become infected, as a reference to the facts relating to the infection of the vessels in this harbor, recorded in the accompanying table will verify. In this it will be seen that of thirty-one vessels which discharged at wharves during the months of July, August, and September, 1879, twenty-eight became infected, only three escaping. One of the latter should be thrown out of the calculation, as its whole crew were acclimated. Thus it will be seen that only one vessel in fifteen at the wharves during these three months escaped infection.

"Second question: '*Which vessels are more apt to be infected, those at anchor near the shore or those more distant?*'

"All of my obseravtion, as well as the facts recorded in the accompanying table, sustain me in the assertion that the liability to infection in this harbor is in an inverse ratio to the distance at which a vessel lies from wharves and habitations. It will be seen in the table that out of nine vessels lying at a short distance from wharves five became infected, or a little more than 50 per cent., while of the eleven vessels which lay at greater distance out in the open bay only two became infected, or not quite 20 per cent. One of these two vessels had a crew of twenty-two unacclimated persons, only two of whom were attacked, one being the captain, who frequented the shore, and the other the steward, who never went ashore. The other one of the two vessels had a crew of twenty-eight unacclimated persons, and none went ashore except the captain; two had yellow fever.

"Attention is called to three vessels, viz, the Antonio Sala, the Skerryrore, and the Lisbon, which entered this harbor on the same day. The first two anchored, discharged, and loaded in the open bay, and on the nineteenth and fifteenth day afterwards sailed away without becoming infected. The Lisbon went to the wharf called San Francisco to discharge, and three days afterwards began to have some cases of yellow fever on board, and soon all on board, eight in number, had the disease severely. This is a striking instance of the difference in the chances of infection, when making comparison between the wharves and the open bay.

"Third question: 'Which vessels are more apt to be infected, those at anchor near to Havana, Regla, Casa Blanca [centers of population], or those at anchor equally near the shore, but more distant from habitations?'

"I am laboring to secure more definite data in regard to these points, but have no hesitation in saying that the nearer a vessel is to wharves and to habitations, the more it is exposed to infection. Thus it has been shown that vessels are far less likely to become infected in the open bay, distant from wharves and habitations; but it should be remembered that one strong element in causing this comparative exemption is undoubtedly due to the limited intercourse which the crews of vessels so situated are permitted to have with the shore.

"Much and long-continued observation, with statistical records, are very desirable on all of these points, never forgetting to note the number of acclimated and of unacclimated persons aboard of each vessel.

"Very respectfully, yours,

"DANIEL M. BURGESS, M. D.,
"*Sanitary and Quarantine Inspector at Havana of the United States National Board of Health.*"

While all freely admit that yellow fever finds a favorable medium on vessels, especially in the parts where air is confined, for the propagation of its poison, the facts now presented are totally irreconcilable with the theory of the spontaneous origin of this poison on ships. While these facts are deemed conclusive, the following tend not only to strengthen this conclusion, but also to throw light on the mooted question, what can and should be done to render the harbor of Havana less dangerous.

The town of Sagua, with a population of some 18,000, is about ten miles from its roadstead, which is a part of the open sea inclosed by islands, and so shallow that vessels anchor several miles distant from the shore. These vessels very rarely, if ever, become infected. The harbor of Cardenas measures some twelve by eighteen miles; vessels are compelled to anchor from one-half to two miles distant from the shore, and in this harbor also the infection of vessels is exceedingly rare—as was the case even during the summer of 1879, when Cardenas suffered with its severest epidemic.

The harbors of Matanzas and of Cienfuegos are much less spacious than the two last mentioned, but much more spacious than the harbor of Havana.[*] A much smaller number of vessels are at wharves, a comparatively larger number are anchored at a distance from the shore and from densely inhabited parts of these towns, and these absolutely less numerous vessels are anchored at greater distance from each other than at Havana. It is difficult to escape the conclusion that it is owing chiefly to these differences that while vessels at Matanzas and Cienfuegos are much more frequently infected than at Sagua and Cardenas, they are much less frequently infected than in the much smaller harbor of Havana.

These facts are also at variance with the origin of yellow fever on ships, and the above conclusion from these facts justifies the following additional deduction. Since man could not render the harbor of Havana cleaner than are the harbors of Matanzas and Cienfuegos, nor by artificial canals renew the water in the former to the extent that nature renews the water in the two latter harbors, the cleansing of the harbor of Havana and the constant renewal of its water, however desirable, would not prevent the infection of the shipping at this port. The facts now presented, and all others collected by this commission, tend to prove beyond question that the poison of yellow fever is on the shore, and *not* in the water of the harbor. The conceivable but impracticable remedy best calculated to diminish those dangers of infection due to any special defects and peculiarities of this harbor would be to so enlarge this that vessels could anchor at much greater distance from the shore and from each other.

There is a final deduction of much scientific importance derivable from the conclusion that yellow fever never originates on ships. This deduction will be better understood if preceded by the statement that the facts occurring within an infected place, and bearing upon the questioned transmission of yellow fever, can be as well explained by infection of locality as by infection through the movable things and persons in such locality;[*] and that therefore these facts as they occur outside of infected localities must be more particularly relied on to solve the question. Now, vessels—because of their restricted limits and of their small and more readily observed contents and population—are the places which present the most numerous and favorable opportunities for the solution of all questions which relate to the modes by which the poison is convey to such places, as well as from thence to other places, and also to the conditio necessary for the propagation of the poison.

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[*] The harbor of Matanzas varies, in respect to its opposite shores, from two and a half to five miles in length and from one and a quarter to three miles in width. Its general anchorage ground varies from one-third to two-thirds of a mile from the shore, the minimum distance being about two hundred yards.

The harbor of Cienfuegos, the most beautiful one visited in Cuba, is entered from the south by a narrow inlet three miles long, and its general size is about eleven miles long and six miles wide at its wharves, which project some three hundred feet from the shore; smaller vessels are loaded, while larger ones are anchored from one-eighth to one-half mile from the wharves.

On the proper study of these questions it greatly depends whether our prese knowledge of the means to prevent yellow fever is to halt or to advance. Medical m of the greatest ability and scientific zeal are needed to prosecute this study in localiti where opportunities constantly abound. If the right men were kept as United Stat sanitary inspectors in the right places thus to pursue this study, results tending preserve the health and lives of millions of human beings and to foster the commerci prosperity of many great cities might be confidently expected eventually to ensue.

VI.

WHAT CAN AND SHOULD BE DONE TO PREVENT THE INTRODUCTION OF THE CAU OF YELLOW FEVER INTO THE SHIPPING OF HAVANA, MATANZAS, AND OTHER CUBA PORTS.

What can be and what should be done are very different questions. To the form it might be answered, the United States can adopt only one measure to protect its effectually and certainly: prohibit the entrance into its ports, during the season whe these are endangered, of all vessels cleared from infected ports. The second questio might be answered with equal brevity, to the effect that the chief thing which shoul be done would be to eradicate the disease from Cuban ports; but, in this regard, t United States can do nothing.

None the less, there are some things which both can and at the same time shoul be done, since they tend to greatly diminish the dangers of infection, and these *palliati* measures will be considered. This consideration will not be strictly limited to t preventing the introduction of the poison at infected ports of departure, but wil include reference to some of the means calculated to eradicate the poison after i introduction into vessels, and to prevent such vessels from continuing to be sources danger to other vessels and other ports.

The measures which will be first mentioned have been either already referred to o are well known, and therefore require only a brief recapitulation. The ballast, especiall at Havana, should, in our ignorance of the subject of fomites, be regarded with su picion, as a probable mode of introducing into shipping the cause of yellow feve Means can and should be adopted to avoid this source of danger; cleaner, denser, les porous, and absorbant ballast could be obtained; this could be kept in places les filthy and wet, and farther from the very edge of the harbor, as some of it now is; an ballast might be disinfected.

Vessels should lie out in the open harbor, as distant from the shore, from centers o population, and from other vessels as may be practicable; and, to the same extent they should avoid intercourse with the shore, and keep to the windward of infecte vessels and localities.

Since pure water and air are the most plentiful and among the most efficient disinfect ants, these should be used in sufficient abundance to maintain in every nook, corner and crevice of a vessel perfect cleanliness and thorough ventilation—all important ends which will never be perfectly secured until the naval architect succeeds in construct ing vessels which will satisfy hygiene as well as commerce and war.

1. *Disinfection.*—Disinfectants should be used in greater amount, more extensivel throughout the ship, and more frequently, when the cargo is discharged, when th reloaded vessel is ready for departure, and during its voyage. On this subject Dr. De Caneda, who, in addition to other official duties already referred to, has charge o the dock-yard of the Spanish navy at Havana, reported to this commission in August, 1879, as follows:

"The royal order of May 10, 1859, decreed that ships of war leaving this port fo the Peninsula (Spain) shall, before sailing, clean, ventilate, and fumigate all the baggage-rooms and berths—operations which must be frequently repeated during the voyage; that all the quarantine regulations shall be enforced with scrupulous minuteness, under the responsibility of the commander and surgeons of each ship, and shall be practiced with energy and care, even when not exacted by the board of health of the lazaret when the ship may be in quarantine; and, finally, that the clothes of those who die at the dock-yard shall be sold there. Since the publication of the above royal order its requirements have been strictly complied with, and during the long period which has intervened (twenty years), and nothwithstanding the considerable number of ships of war which have arrived at the Peninsula from this dock-yard, in none of them has a case of yellow fever appeared."

It should be observed that this royal order makes no restrictions as to season, but that vessels of the Spanish navy are required throughout the year to cleanse, ventilate, and disinfect. Since the poison of yellow fever manifests some activity at Havana during every month of the year, it is a wise precaution to insist that all known means for protection should be continued during even the winter. The annals of medicine record the cases of many vessels which, once infected, have, while sailing around Cape Horn or to the frozen regions of the north, had this infection apparently destroyed—to reappear, however, with renewed activity, on the return of such vessels, even months afterward, to regions of elevated temperature. Hence, as the superabundant poison at Havana sleeps, but only restlessly, during the winter, the vessels there, more numerous and more exposed than at all other ports, should be under constant supervision. Such supervision would not only tend to destroy a poison which later might inflict widespread injury, but it would also tend to accustom vessels to submit to measures imperative throughout not less than five months of every year, to habituate sanitary inspectors to all the details of their important duties, and to promote a better knowledge of the poison, through their official records of the sanitary condition and history of all vessels inspected.

While thus referring, in connection with disinfection, to the special need of a sanitary medical officer at Havana throughout the year, it may be well to add that the careful study by such an officer of the few isolated cases of yellow fever which occur during winter would be likely to throw more light on the etiology and prevention of the disease than a like study at other seasons, when the cases become so numerous that it is impossible to trace out, through many confused perplexities, their essential attending circumstances. It should also be remembered that there is no place comparable to Havana for the opportunities presented to try the efficiency of experiments on the disinfection of vessels with cold, steam, hot air, &c.; and that our knowledge of the means to protect vessels would be greatly advanced if an efficient officer, with adequate means, were employed in Havana for this purpose alone.

While the cleansing, ventilation, and disinfection of vessels in Havana, at all seasons of the year, would be a wise precaution, these measures are still more especially required to be applied to those vessels which lie at or even touch the wharves and to those which are destined to the southern ports of the United States. Finally, it should not be forgotten, in reference to the disinfection of shipping, that the number of yellow-fever cases on board a vessel is not an infallible criterion of the extent to which this vessel may be dangerous, and to which it needs disinfection; for vessels have been repeatedly proved to be most dangerous though there had been no sick on board at the port of departure, nor during the voyage, nor on arrival at the port of entry; none immediately suffering except those engaged at the latter port in discharging the cargo.

2. FOMITES.

France, because of its colonies in the West Indies, and on the west coast of Africa, has had a prolonged experience with yellow fever, and no nation has equaled this in the length of time during which it has had an able corps of sanitary medical officers for the inspection of ships and for the study of the means to prevent the importation of this disease. Hence, French experience deserves special respect. France declares by law what merchandise on vessels shall be treated as yellow-fever fomites, and in respect to these imposes sanitary precautions in the following order:

First class—most dangerous: "Clothing of all kinds and effects in use, rags of all kinds, skins, feathers, hair, and generally the *débris* of animals, linen and silk materials."

Second class—much less dangerous: "Cotton, flax, and hemp."

Third class—so little dangerous that no special precautions are required: "All objects not included in the above classes."

It follows that materials of the first class, as also any others to which experience may attach strong suspicion, should be treated with special precautions, not only at the port of entry, but also at the port of departure, and during the voyage.

3. NON-INTERCOURSE WITH THE SHORE, AND REMOVAL OF THE SICK FROM VESSELS.

In order to render as absolute as practicable non-intercourse with the shore, acclimated persons should be employed as intermediates between the vessel and the shore, and to do all work needed on board, especially in the hold of the vessel.

To further prevent the introduction and persistence of the cause of yellow fever in the shipping of Havana and other ports, it is very important, however difficult in practice, to exercise supervision and control over all persons, together with their clothing and baggage, on board these vessels while in harbor. Any person sickening with a suspicious disease should be forthwith removed with his bedding and effects to the land, and his apartment with all its contents should be promptly and thoroughly cleansed, ventilated, and disinfected. Persons sick with a suspicious disease should not be admitted on board, nor should those who have been recently sick be received too soon after recovery, nor without special precautions in respect to their effects and their persons.

Briefly, then, special sanitary precautions, as to the vessel itself and as to all things and persons taken on board, can and should be exercised to prevent the introduction of the poison into vessels at infected ports. But, while few sanitarians will at the present day question that these precautions should and can be exercised, all w admit that their execution is difficult, and requires the employment of—

4. RIGHT METHODS AND MEN.

Congress enacted a law June 2, 1879, to supply these requirements, and some of t questions involved in this law, and having reference to the duties assigned this co mission, must be referred to. But brief reference will be made first to a much old law, which has a bearing on the sanitation of vessels, though not enacted for tl purpose; and a still briefer reference must also be made to another subject of subo dinate interest.

The law just referred to was enacted for and subserves the humane purpose of pr tecting our sailors from being left destitute in foreign ports. It requires that Ame can vessels shall pay, for the benefit of sailors, discharged under certain specified co tingencies, "three months' extra wages; and one of these contingencies is the dischar of a sailor because disabled by sickness. An evil result of this law is that ignoran inhumane, or avaricious captains, especially of small sailing vessels, not infrequent detain on board, to the risk of infecting vessel and crew, sailors attacked with yello fever. Further, in cases where the sick sailor has been removed from the vessel, an has recovered, such captains are prone to receive him and his effects on board at a earlier period of convalescence than is prudent, and without exercising proper pr cautions. It is possible that this evil would be diminished if the law were so amende that captains would not be forced to pay the "three months' extra wages" in case where a sanitary inspector or a respectable physician certified that the sick sailor presence on board endangered either the sailor himself, the crew, or the vessel. Als it is probable, were it required that all cases of suspicious disease occurring or re ceived on a vessel while in harbor should be reported in its "bill of health," and i vessels with such bills of health were treated at the port of entry with exception rigor, as they should be, these measures would also tend to rectify the evil. Howeve the sanitary expert may rest content with calling attention to a legal evil, leavin its rectification to legislative experts.

The commission is not prepared to recommend what legal measures should b adopted to secure two very desirable ends—the prompt report to the United State consul of all cases of suspicious disease present on a vessel, and the non-intercourse o persons on board with the shore. In reference to the latter, that able, zealous, an experienced officer, Mr. Henry C. Hall, United States consul-general at Havana, wa addressed, and replied as follows:

"In answer to your question, I will say that, as regards this port, nearly all vessel (other than steamers), and especially vessels bringing cargoes and coals, discharge a the wharves, and I can suggest no measure that the United States could adopt, no that the port authorities could adopt, short of actual confinement, which would tend to prevent the crews of such vessels from visiting the shore; indeed, I do not perceive that anything would be gained by such a measure, for the seamen while lying at the wharves are practically on shore. Vessels lying in the harbor, away from the wharves, are better situated in this respect; but, as a rule, masters of vessels in this port make every effort to keep their men on board, not only to avoid sickness, but to prevent drunkenness and its usual results, insubordination and desertion."

The "act to prevent the introduction of contagious and infectious diseases into the United States," approved June 2, 1879, provides in sections 2, 3, 4, and 5 the means to be adopted to prevent the introduction of any such disease into a vessel at its port of departure, an end of primary importance to the accomplishment of the purpose of the law. Means are prescribed to obtain information through consuls as to what ports are infected; to force every vessel at such port and bound to the United States to comply with the rules and regulations necessary "to secure the best sanitary condition of such vessel, her cargo, passengers, and crew," and to provide the most dangerous of these ports with medical men as sanitary inspectors, these officers being indispensable to the efficient execution of the law. The law decrees that it "shall not be lawful" for any vessel to enter into any port of the United States without the prescribed "certificates required to be obtained at the port of departure," and imposes a heavy penalty for any such infraction of the law. The act further provides "that none of the penalties herein imposed shall attach to any vessel, or any owner or officer thereof, till the act and the rules and regulations made in pursuance thereof shall have been officially promulgated for at least ten days in the port from which said vessel sailed."

None will deny that this law indicates great progress in national sanitation, and that its purpose deserves earnest commendation. Whether it trespasses on international rights is a question which concerns experts in such matters. However, it is certain that other nations have thrown obstacles in the way of its execution. In Cuba it was violently denounced by the press, and was referred to with gratification as the cause of "many and sovereign rebuffs" to our country, whose officials, instrumental in making and in executing it, were broadly intimated to be ignoramuses, "ragamuffins," and "insignificant individuals who had succeeded in climbing into public office." Much other ridicule, banter, and defiance were indulged in, none of which would be worthy of mention except for the fact that the press of Cuba is subjected to official censorship, and can publish nothing without authority.

The action of the authorities in Cuba was as follows: About August 14, 1879, Dr. Burgess received in Havana his appointment as United States sanitary inspector of that port. On August 28 the United States consul-general applied for the permission indispensable to officially promulgate the law, as required by the act; and without which promulgation, as no penalties could be enforced, the act would be inoperative. The permission to promulgate was not granted, and about this time appeared the following order in the Official Gazette:

"OFFICE OF THE MILITARY COMMANDANCY OF MARINE,
AND OF THE CAPTAIN OF THE PORT OF HAVANA,
Health Department, Havana, August 25, 1879.

"It being very frequently requested by the consignees of vessels carrying more than sixty persons, counting passengers and crew, that their departure shall be allowed with a hospital steward on board instead of a surgeon, under the plea that a surgeon cannot be found; and as it is ordered in the health regulations and royal order of November 28, 1848, that on no account should such vessels be cleared without a physician and chaplain on board, the board of health of this port has decreed the strictest compliance with the above, and, in order that commerce and shipping shall not suffer any prejudice or delay therefrom, this order is made known to *whomsoever it may concern*, with the understanding that consignees shall not be allowed to open a register for passengers without complying with the prescribed regulations.

"At the same time those physicians who desire or whom it may suit to utilize their knowledge among the shipping may call at this office during business hours, and leave their names and addresses, in order to be advised in case their services are required.

"MANUEL DELGADO."

As to whom this order may concern, the Boletin Commercial of September 6 announced: "As our maritime authorities are determined to strictly enforce this order, we publish it to-day, so that it may be made known to the consignees, owners, and captains of *all* vessels plying between *any foreign* and this port.

The following order, of much greater consequence than the preceding, issued from headquarters, and was published on August 30, 1879, for the first time in the Official Gazette:

"HEALTH-CIRCULAR.

"His excellency the governor-general being informed, by different communications presented to him by the health department of the port of Havana, of the practice, observed by some consuls residing in this city, of issuing bills of health to national as well as to foreign vessels leaving the said port—in contravention of the laws upon the subject in force in this island, and thus causing injury to the public revenue—his excellency has been pleased to order that it be made known by means of the present circular to the said consuls that, it being provided that the documents referred to shall be issued solely and exclusively by the Spanish employés in charge of this branch of the public administration, they shall restrict themselves to certifying upon the said bills of health the authenticity of the signatures authorizing the bills of health, and their own opinion in regard to the sanitary conditions therein set forth.

"Which, by order of his excellency, is published in the Official Gazette for general information.

"Havana, August 27, 1879.

"*The Secretary of the General Government,*
"JOAQUIN CARBONELL."

It is noteworthy that the United States consul-general applied for permission to promulgate the law of the United States on August 28, and that although the above quoted order is dated August 27, it was not published "for general information," nor otherwise made known to the officers of the United States, until August 30. It is also noteworthy that both of these officials should base their justification on obsolete, forgotten laws, which were revived at the very time when efforts were first made to execute the law of the United States. For the purpose of aiding the interpretation to be given the latter order, it may be added that on September 6, 1879, the following telegram was received by the United States consul-general at Havana:

"MATANZAS, *September* 5, 1879.

"The captain of the port of Matanzas refuses to clear an American vessel unless she takes a Spanish bill of health.

"WASHINGTON,
"*United States Vice-Consul at Matanzas.*"

An ineffectual protest was made.

After August 30 the Spanish steamship *Castilla* left Havana for New York witho the "certificates required to be obtained at the port of departure," and for this i fraction of the law the penalty decreed was not enforced at the port of entry.

Such is the brief history of the overthrow of this law at both ends of the line—a la so important that if its provisions are not to be enforced it seems idle to discuss th question, "What can and should be done to prevent the introduction of the cause yellow fever into the shipping at Havana, Matanzas, and other Cuban ports?" Fo nothing of any consequence will ever be done except under the supervision of officials whom the United States can hold directly responsible for the enforcement "such rules and regulations" made by its authority as may prove necessary "to secure the best sanitary condition of a vessel (at an infected port), her cargo, passengers, and crew." Bills of health should be not merely idle and even deceptive formalities, but ample proof of what they purport to be. This can never be assured at an infected port of departure, except through officers who are not only stimulated b self-interest to protect the welfare of the port of entry, but who are also competent t determine the conditions necessary to insure that a departing vessel is really "clean and free from danger to others. To the sanitarian it is a deplorable farce that commerce should be burdened with such "clean bills of health" as the Cuban authoritie at Havana issued after October 4, 1879—a date when there had been not less tha twenty deaths by yellow fever during the week, and when there were eighty cases i existence on that very day, and nine vessels in the harbor manifestly infected.

It remains to be seen whether the Congress of the United States will, in referenc to its violated law, lend its ear to the alleged interests of commerce solely, or to the inseparable interests both of commerce and of the public health; whether having taken a notably forward step in sanitary progress it will falter, or will advance firmly, even if slowly and cautiously.

In this connection it is pertinent to recall the historical fact that while the authorities in Cuba interfered in 1879 with the execution of the sanitary and quarantine laws of the United States, it is only a few years since the sanitary laws of the former proved equally obnoxious to the latter, and were enforced against it most objectionably. In July, 1866, the Governor-General of Cuba, "consequent upon the information transmitted to his excellency by the Spanish consul in Philadelphia, of cholera having appeared in that city," declared foul *all the ports* of the United States, and decreed that all vessels arriving from them at the ports of Cuba should be subjected to the most rigorous quarantine." Accordingly they were so subjected, and without regard to clean bills of health countersigned by Spanish consuls in ports of the United States, to the port from whence they came, to the date of their departure, to the length of the voyage, "or to any other consideration whatever." Moreover, the quarantine for the whole island was established on the north coast, twenty-five miles west of Havana, at the port of Mariel, and all American vessels bound to any Cuban port were forced to proceed to Mariel, though this might be, as in the case of Santiago de Cuba, nearly a thousand miles from their port of destination. This commission has a list of forty-nine such vessels, which, during solely the two months of August and September, 1866, were thus forced into quarantine at Mariel.

In view of the facts now presented of the causes which have given rise to mutual complaints, and of the doubts which have sprung up, not as to the wisdom of the theory, but as to the practicability and international legality of the law of June 2, 1879, it becomes an important question whether the humane and laudable objects of this law will not require for their realization a conference of all maritime civilized nations, in order to establish an international sanitary code for their mutual protection. So far as Cuba alone is concerned, table No. 2 and the note following table No. 1 show to what large extent the vessels of other nations are involved in the execution of our law, and that while Spain and Great Britain are chiefly interested in behalf of their shipping, the vessels of not less than ten other nations sailed during one year from the ports of Cuba to those of the United States.

Such a conference and such a code are not without precedent. France, which has in many good things been the leader of civilization, summoned a conference in 1851 of the maritime nations of Europe; medical and consular representatives assembled from twelve of these, including Spain, and Egypt as a dependency of Turkey, and on May 27, 1853, an international sanitary code or treaty was agreed upon.

Since each maritime nation is seriously affected by the sanitary regulations and other restrictions at the ports of all other nations, it is important that these restrictions should be made as little burdensome to commerce and as *uniform* as is practicable. This cannot be accomplished without agreement between the nations interested. The experience of the last summer in regard to the execution of the law of June 2, 1879, makes it manifest that one nation cannot exercise within the limits of another even such sanitary supervision over vessels proceeding from the latter to the former, and as is indispensable for the protection of the former, without giving offense. Spain in 1879 interfered, in connection with yellow fever, with the execution of the law of the

United States; but how long will it be before offense is given to other nations in connection with cholera, plague, or other transmissible disease prevailing at their ports, and thereby threatening our own? The interests of sanitation are those of humanity and of civilization, and the advancement of these interests should be through the paths of peace, through mutual concessions and enlightened co-operation.

For these and other reasons, it is believed that the United States, one of the chief maritime powers of the world, and the one whose extensive coast most exposes it to invasion by disease, cannot at too early a date strive to secure an international sanitary code.

Advocates of this measure can derive important instructions from the international sanitary regulations of 1853, which have been referred to. Certain general principles were agreed upon, such as that no nation should be guilty of the inhumanity of prohibiting a vessel in distress, whatever else might be its condition, from entering any port: and such as, that in all cases of doubt as to the execution of any of the details concurred in the benefit of that doubt should be construed in favor of the public health rather than in favor of the immediate interests of commerce and gain. In addition, *uniform* regulations were established in reference to numerous details, which concern the following four principal subjects: first, some degree of uniformity and efficiency in the organization of sanitary authorities at seaports; second, regulations as to vessels arrived at a port of entry, including the establishment of quarantine, lazarets, &c.; third, regulations to be observed on vessels during their voyage, including the penalties to be enforced at ports of entry for their non-observance; fourth, rules and regulations as to vessels at ports of departure, devised to prevent the introduction of transmissible diseases into these vessels. Only the last subject will be further considered, since it alone falls within the official instructions to this commission.

In regard to the port of departure, it was agreed that official reports should be regularly furnished, by the sanitary authorities of the place, of its true sanitary condition, including the appearance and disappearance of transmissible diseases; that the hygienic condition of every vessel, its cargo, crew, passengers, and provisions of water and food to supply these, should be inspected and certified to; that the vessel should be inspected in all its parts, not only before loading, but also after this, to see that orders issued in reference to cleansing, ventilation, and disinfection had been obeyed, and that all things needful to maintain health on board had been provided: that those sick of transmissible disease should be prohibited from going on board; that captains should be required to furnish sanitary inspectors with all necessary information and aid; that vessels of foreign nations should be visited in company with their consuls; and, finally, that a uniform bill of health should be adopted, which should in every case be either "clean" or "foul," and should be invalid unless issued within forty-eight hours before the vessel's departure. Such are the principal details which the thirteen contracting nations deemed it important to agree upon for the purpose of preventing the introduction of transmissible diseases into the shipping at ports of departure.

But in connection with this preliminary report further instruction is derived from these international regulations in respect to the nationality of the officials by whom the above details were to be supervised and enforced. These duties were intrusted to the local officials at the port of departure, except in the ports of the Orient. So great was the fear of the plague and of cholera, that special provisions were agreed to, in 1853, as to Turkey and Egypt, although, as early as April, 1847, France had dispatched to the Levant its own sanitary inspectors. It was agreed that the contracting nations should station in the Orient a certain number of sanitary physicians, and that their distribution should be allotted between, and be regulated by, these nations. Although ordered to cultivate friendly relations with the people and officials of the country, each was made responsible to his own government alone; and, though subjected to the jurisdiction of his own consul, each was rendered totally independent even of him in the discharge of his medical duties. The sanitary officer was invested with all power requisite to protect his own country and to aid in securing the safety of all the contracting parties.

It thus appeals that in Europe it was deemed necessary, in 1853, to obtain the consent of Turkey that foreign nations should appoint sanitary inspectors to discharge their appropriate duties within its jurisdiction. One additional topic of interest remains to be noticed. Article 137, Title X, of the International Sanitary Regulations contains the following:

"*Dispositions relative to America.*

"In the countries subject to yellow fever, and which belong to the contracting parties, and where a regular medical service has not yet been established, there shall be appointed, by the respective governments, sanitary physicians to study this disease, its modes of production and propagation, to seek the means of preventing and combating it, to notify its appearance and disappearance to the authorities, and, in fine, fulfill officially, in respect to yellow fever, the mission with which the sanitary phy cians in the Orient are charged in regard to the plague."

Finally, the facts of chief importance having now been stated, this commissi deduces therefrom the following conclusions in reference to the question propound by the National Board of Health and now under consideration: Certain palliati measures which have been specified can and should be adopted. The execution these measures depends upon the rigid enforcement in the ports of Cuba, and esp cially in Havana, of such provisions as are contained in the act of June 2, 1879. Th effectual enforcement of this act requires the consent and aid of Spain at least, a since all maritime nations are interested in the execution of this act, an internation sanitary code is most desirable for the establishment of such uniform rules and re ulations as the general interests of national sanitation require for many purposes, well as for the special purpose of preventing the introduction of transmissible diseas into the shipping at infected ports of departure.

VII.—EXAMINATION OF THE BLOOD IN YELLOW FEVER.

In yellow fever, as in the specific febrile diseases generally, changes in the const tution of the blood have commonly been believed to constitute the most importa pathological result from the action of the specific poison of the disease; and it is a sumed that the poison must exist in the circulating fluid, although in the majority diseases it has heretofore eluded microscopical and chemical researches. In certai diseases, however, it is claimed that the presence of vegetable organisms, known und the general name of bacteria (*Schizomycetes*, De Bary), which are found in the bloo or other fluids of the body, is the essential feature in the etiology of the diseases i question (charbon or splenic fever, relapsing fever, septicemia, and infectious pne mo-enteritis of the pig). Many facts relating to the origin and progress of yellow fever epidemics have induced a large number of the physicians most familiar wit this disease to anticipate the discovery of a similar organism in the blood of patient suffering from it; and, indeed, the discovery in the blood of yellow-fever patients o microphytes, supposed to bear a causal relation to the disease, has already been announced by several observers (Jones and Richardson). It was therefore imperativ that in the Havana investigation a thorough microscopic examination of the bloo should be made. For this purpose the commission was supplied with all necessar microscopical apparatus, including the best objectives obtainable. Provision was als made for making a permanent and indisputable record of whatever might be demonstrated by the microscope by means of photography. One member of the commissio prepared himself especially for this work at the Army Medical Museum, where Dr. J J. Woodward kindly gave his personal attention to his instruction. It is well know that Dr. Woodward has achieved a success in photo-micrography unsurpassed in an part of the world. In Havana Dr. Sternberg gave a large share of his time to the microscopic examination and photography of the blood. No chemical examinatio was attempted. The patients from whom specimens of blood were obtained wer mostly soldiers in the military hospital of San Ambrosio. Ninety-eight specimen from forty-one undoubted cases of yellow fever were carefully studied, and one hundred and five photographic negatives were made, which show satisfactorily everything demonstrable by the microscope. These photographs were mostly made with a magnifying power of 1,450 diameters, obtained by the use of Zeiss's one-eighteenth-inch objective and Tolles's amplifier. Probably no better lens than the Zeiss one-eighteenth (oil-immersion) could have been obtained for this work, and it is doubtful whether any objective has ever been made capable of showing more than is revealed by this magnificent lens. With the power used, organisms much smaller than those described as existing in the blood of charbon or of relapsing fever would be clearly defined.

If there is any organism in the blood of yellow fever demonstrable by the highest powers of the microscope as at present perfected, the photo-micrographs taken in Havana should show it. *No such organism is shown in any preparation photographed immediately after collection.* But in certain specimens, kept under observation in culture cells, hyphomycetous fungi and spherical bacteria made their appearance after an interval of from one to seven days. The appearance of these organisms was, however, exceptional, and in several specimens, taken from the same individual at the same time, it occurred that in one or two a certain fungus made its appearance and in others it did not. This fact shows that the method employed cannot be depended upon for the exclusion of atmospheric germs, but does not affect the value of the result in the considerable number of instances in which no development of organisms occurred in culture cells in which blood in a moist state was kept under daily observation for a week or more.

The method employed seemed the only one practicable for obtaining blood from a large number of individuals without inflicting unwarrantable pain and disturbance upon the sick. It was as follows: One of the patient's fingers was carefully washed with a wet towel (wet sometimes with alcohol and at others with water), and a puncture was made just back of the matrix of the nail with a small triangular-pointed trocar from hypodermic syringe case. As quickly as possible a number of thin glass covers were applied to the drop of blood which flowed, and these were then inverted over shallow cells in clean glass slips, being attached usually by a circle of white zinc cement. In dry preparations, which are most suitable for photography, the small drop of blood was spread upon the thin glass cover by means of the end of a glass slip.

The thin glass covers were taken from a bottle of alcohol and cleaned immediately before using, and usually the glass slips were heated shortly before applying the covers, for the purpose of destroying any atmospheric germs which might have lodged upon them. These precautions were not, however, sufficient to prevent the inoculation of certain specimens by germs floating in the atmosphere (Penicillium and micrococci); and in nearly every specimen the presence of epithelial cells, and occasionally of a fiber of cotton or linen, gave evidence that under the circumstances such contamination was unavoidable. It is therefore believed that any organism developing in the blood of yellow fever or of other diseases collected by the method described, or by any similar method, can have no great significance, unless it is found to develop as a rule (not occasionally) in the blood of patients suffering from the disease in question, and is proved by comparative tests not to develop in the blood of healthy individuals, obtained at the same time and by the same method.

Tried by this test, it must be admitted that certain fungi and groups of micrococci, shown in photographs taken from specimens of yellow-fever blood collected at the military hospital and preserved in culture cells, cannot reasonably be supposed to be peculiar to or to have any causal relation to this disease. While we can claim no discoveries from the microscopic examination of the blood bearing upon the etiology of yellow fever, some interesting observations have been made relating to the pathology of the blood in this disease.

It is not intended in this report to do anything more than make a brief reference to these observations, as a comparative study of the blood of other diseases will be required to give value to them, and a detailed report upon this subject is to be made at some future time. The most important observation made relates to certain granules in the white corpuscles shown in many of the photo-micrographs taken. From the manner in which these granules refract light, and for other reasons, they are believed by Dr. Sternberg to be fat, and to represent a fatty degeneration of the leucocytes.

The blood of twelve healthy individuals was examined in Havana for comparison, and in nearly every case an occasional leucocyte was found to contain a few (one or two) granules undistinguishable from those found in the blood of yellow fever; but this was the rare exception; while in severe cases of yellow fever the granules were abundant, and nearly every white corpuscle contained some of them.

VIII.—EXPERIMENTS UPON ANIMALS.

It has been commonly reported, and is asserted by several writers of acknowledged ability, that during the prevalence of yellow fever certain of the inferior animals exhibit symptoms of sickness which are attributable to the influence of the yellow-fever poison.

(Vide Barton, Cause and Prevention of Yellow Fever, third edition, pp. 52-55; Feraud De la Fiévre jaune à la Martinique, p. 271; La Roche on Yellow Fever, volume 2, pp. 316-318; Blair, Yellow-fever Epidemic of British Guiana, third edition, p. 63.)

In view of these reports, the commission was instructed as follows: "It is obvious that if it be found possible to produce some specific symptoms in some one of the lower animals by exposing such animals in localities known to be capable of producing the disease in man, and thus to establish a physiological test of the presence of the cause of the disease, we may even hope to be able to determine the nature of and the natural history of this cause, although prolonged investigation may be necessary to effect it."

The commission has endeavored to carry out the views of the Board of Health in this direction, but in consequence of the limited time at its disposal, the want of a suitable place to keep the larger animals, and the amount of work in other directions expected from it, it has been found impossible to make an exhaustive experimental investigation. Enough has been done, however, to make it appear highly probable that the sickness and mortality reported among animals during the prevalence of yellow-fever epidemics has been improperly ascribed to the influence of the yellow-fever poison. It is well known that many of the inferior animals suffer from epidemic diseases peculiar to their several species, and this is especially the case in southern latitudes. We know of no reason why such epidemics should not occur coincidently with yellow fever in man, and it is not surprising that many people unaccustomed to close observation should attribute the sickness in man and in the animals affected to the same cause. In advance of any experiments designed to test the truth of such a dedu tion, it seemed quite improbable, from the fact that the supposed effect only resu exceptionally, if at all, while domestic animals are frequently exposed in large nu bers, in localities visited by severe epidemics of yellow fever, without exhibiting a symptoms of sickness. This fact is vouched for by many competent observers and verified by the personal experience of two members of this commission.

Nevertheless, in view of the reports referred to, of the great importance in the pro cution of the investigation of a test of the presence of the poison, and of the pos bility that by close observation and the use of the clinical thermometer some sympto heretofore overlooked might be discovered sufficient to serve as such a test, it was e dently imperative that experiments should be tried in this direction. Arrangemen were accordingly made before leaving New York for a supply of animals as require and on the 24th of July the following were received per steamer Niagara, viz: Fo dogs, two cats, six rabbits, six guinea-pigs, one monkey, six chickens, twelve pigeon and two geese. Subsequently (August 30) six more dogs were received.

All of these animals were carefully observed, and various experiments were tried f the purpose of testing their susceptibility to the influence of the yellow-fever poiso The details of these experiments are given in a special report to the National Board Health, dated October 15. It is not deemed necessary to give these details in the pre ent report, but the general statement may be made that the results were negative. N symptoms were produced in any of the animals experimented upon which can fairly b attributed to the influence of the yellow-fever poison.

The clinical thermometer was constantly used for the purpose of recognizing an slight febrile movement which might possibly occur, and the blood was examine microscopically from time to time. As the experiments made gave no promise positive results, the commission did not feel justified in giving more time to this po tion of the investigation. It is, however, of the opinion that the reports heretofo referred to and the importance of a physiological test of the presence of the poiso would justify the National Board of Health in pursuing this inquiry in future, esp cially with such animals as this commission has not experimented upon. A few expe iments are here given as examples of those made:

Experiment No. 1.—On the morning of July 28, four days after arrival in Havan the following animals were exposed on board the infected brig John Welch, jr., vi two dogs, two cats, one monkey, two rabbits, three guinea-pigs, two geese, thr chickens. The time of exposure was forty-eight hours, at the expiration of whic time the animals (in cages) were brought back to the laboratory. The Welch was very foul ship, and was loaded with molasses. During the time the animals remaine on board six of her crew (all) were down with yellow fever. After bringing the an mals back to the laboratory the temperature of each was carefully taken, and dail observations were continued for some time after. No symptoms of sickness presente themselves except in the case of one dog. This animal suffered a sharp attack o fever, but it is believed that the case was one of a disease common to imported dog in Cuba known as *romadizo*, a disease the clinical history of which is very differen from that of yellow fever. (See special report to National Board of Health, date October 16, for full history of this case.)

Experiment No. 4.—Injected yellow-fever blood, 1¼ drachms, of first day into femo ral vein of dog No. 3. Blood obtained by cupping from patient in civil hospital an mixed with a small quantity of soda bicarb., to prevent coagulation. *Result*, entirel negative.

Experiment No. 10.—One-half of a blanket from a yellow-fever patient's bed wa placed in the cage with dog No. 4 and left there for several days. *No result.*

Experiment No. 11.—Dog No. 5 was allowed no water for two days, except a suppl in which the other half of this blanket (Experiment No. 10) had been washed. *N result.*

Experiment No. 14.—Injected cocoanut water, drachm, containing numerous act ively moving bacteria (*B. termo*) into external saphenous vein of dog No. 7. Thi fluid had been inoculated two weeks previously with yellow-fever blood of the firs day, which was sent from the civil hospital (without precautions to exclude atmos pheric germs) and had been kept since in a beaker covered with glass plate and bel jar—Lister's apparatus. The blood of this dog was carefully examined five hour after the operation, and again on the following morning, Spencer's one-tenth inc objective used for examination. No bacteria were seen and no appreciable symptom resulted from the injection.

IX.—CULTURE EXPERIMENTS.

If the essential cause of yellow fever exists in infected localities as a living germ or organism, capable, under favorable conditions, of indefinite multiplication, a hypothesis which explains the phenomena of epidemics better than any other, and which has much in its favor, then one of the most promising methods of investigation would seem to be by experiments designed to promote the increase of the hypothetical germ in culture cells, bottles, &c., for the purpose of microscopic examination and physiological experiment.

In Havana various culture experiments were made, of which only a brief account will be given in this preliminary report. Many specimens of yellow-fever blood, preserved in culture cells, were kept under daily observation for from three to ten days from the time of collection. In some of these, hyphomycetous fungi, and in others spherical bacteria were developed, but in a majority nothing of the kind was observed, and there is good reason to believe that the exceptional appearance of these organisms was due to inoculation of the drop of blood by atmospheric germs during the short time occupied in collecting and mounting the specimen. (*See* report on examination of the blood.) In these culture experiments, and all others tried, it was assumed that the summer temperature of Havana is favorable for the development of the yellow-fever germ, and no artificial heat was used. Organic fluids, such as urine, black vomit, and the fluid from the interior of unripe cocoanuts, exposed in the laboratory, very soon became filled with a variety of vegetable organisms, bacteria, torulæ, vibriones, and other fungi, such as are found under similar circumstances in all parts of the world. Most of these were well-known and common forms; some may have been peculiar to the latitude or even to localities infected with yellow fever, but to decide this question would require a more precise knowledge in regard to these low forms of vegetable life, than was possessed by any member of the commission, or, indeed, than is likely to be found even among those who have devoted the most attention to this branch of study, which is acknowledged by all to be yet in its infancy.

Photo-micrographs were made of some of these forms, and it is suggested that photographic representations of all forms found in southern parts of the United States at a time when yellow fever does not prevail should be made in advance of the next epidemic, so that any unusual form presenting itself then may receive the special attention of future investigations.

The transparent liquid from the interior of an unripe cocoanut, called in Cuba "aquacoco" and in the United States cocoanut milk, was found to be well adapted for culture experiments. Drawn from the nut with proper precautions into a Florence flask provided with a Tyndall filter, it was preserved in the laboratory for two months transparent and free from bacteria. But when exposed to unfiltered air it very quickly became filled with bacteria, torulæ, and various fungi. Some of these are shown in the photo-micrographs taken in Havana. The following culture experiments are given in detail, as it is believed that the method is worthy of adoption by future observers:

Experiment.—Placed in a wide-mouthed quart bottle, a little sea water and a considerable quantity of sea-weed from the beach, taken from a locality supposed to be infected. Two glass tubes passed through the cork of this bottle for the purpose of allowing the air contained in it to be aspirated through a small quantity of glycerine or other liquid for microscopic examination. In a second bottle, having a capacity of two quarts, was placed a fragment of blanket from the bed of a yellow-fever patient and a double handful of rotting sawdust. The cork was also provided with tubes for aspiration of the contained air. Both of these bottles were placed outside of the laboratory, where they were exposed to the sun during the day and from time to time the enclosed air was aspirated through a drop of glycerine jelly. Upon microscopic examination the specimens from both bottles were found to contain numerous spores of penicillium and probably of other fungi, vegetable *débris*, epithelial cells from bottle No. 2, and a microscopic fungus, which being unknown to the observer and occurring in considerable abundance attracted especial attention.

It was found that the most satisfactory way of collecting this fungus was by suspending in the bottle by a string a small glass beaker, in the bottom of which was placed a thin glass cover. The cork being replaced the bottle was left undisturbed for two days. The beaker was then removed and the thin cover was inverted over a circle of white zinc cement turned upon an ordinary glass slip. The fungus could then be studied by the microscope and was best seen by reflected light. No attempts are made to describe this fungus or other organisms observed in the culture experiments made, as there has been as yet no opportunity to submit the specimens obtained and the photographs made to the critical examination of an expert mycologist.

X.—EXAMINATION OF WATER OF HARBOR.

The prevalence of yellow fever in Havana as an endemic disease has been supposed by some to be due to the narrow entrance and small size of its harbor, and to the fact that the drainage and sewerage of a large portion of the city is poured into this land-locked basin, which has no fresh-water stream of any size flowing into it, and consequently no means of purification except by deposition of suspended matters and by tides, which here do not rise more than twenty-four inches. To remedy this supposed source of disease expensive engineering schemes have been proposed, having for the object the admission of a sufficient volume of water, through canals from the gulf o from the Almandarez River, to effect the purification of the water of the harbor b means of a constant current through it. Whether these schemes are practicable o not is a question for engineers to decide. Whether they would be effectual in accom plishing the desired result is a question for the consideration of sanitarians in advanc of any expensive engineering undertaking. With a view to furnishing data upo which to found an opinion in regard to this matter, numerous samples of water fro the harbor were examined, with the following general result:

When there has been no rain for some time the water of the harbor is tolerably tran parent, and has the same specific gravity as the water of the gulf just outside, viz 1.020 at 85° Fah. Water collected from near the shore in front of the San Carlos Hote during the dry season, was found to be transparent and odorless, and to have a specif gravity of 1.022 at 84° Fah. It deposited on standing a very slight sediment, con taining vegetable *debris* and a few animalculæ.

This water, exposed in the laboratory in a wide-mouthed bottle for two weeks, di not undergo any putrefactive change recognizable by the sense of smell or by a chang in transparency. After a heavy fall of rain, however, the water became muddy i appearance, seen in mass, and the specific gravity of samples collected near the shor fell to 1016 or even to 1005 in the vicinity of sewers and places where the drainag from the streets made a considerable stream of fresh water. These specimens of lo specific gravity contained considerable amorphous mineral matter, vegetable débris and infusoria of various forms, including spirilla, vibriones, and rod-bacteria. Thes bacteria did not exhibit active movements, and doubtless had been washed into th harbor from the streets and sewers. Probably, being fresh-water species, their repro ductive power, if not their vitality, was soon destroyed by the salt water. In th vicinity of the fish market, and elsewhere, where sewers discharge into the harbor the water has an offensive odor, and evidently contains much putrefying organic ma terial. There is reason to believe that the atmosphere in the vicinity of these place is unwholesome and that the yellow-fever poison lurks about such insanitary localities But that the water of the harbor generally is contaminated with this poison seem doubtful. Ships which anchor some distance from the shore, and which discharge an receive cargo at their anchorage, certainly do not suffer to the same extent as thos which come to the wharves, and where stringent regulations are enforced to preven the crews from going ashore they often escape entirely.

There is reason to believe, therefore, that the putrefying organic matter washed int the harbor from the streets of the city and margins of the basin generally is so dilute and changed by the salt water that a short distance from the shore it loses its potenc for mischief. Probably no inflow of water through a canal would prevent entirel the insanitary condition of limited areas in the immediate vicinity of the discharg of sewers. And it seems to this commission that money and engineering skill woul be more profitably expended in paving the unpaved streets; in constructing ston wharves in place of the wooden ones which now serve as traps for all kinds of filth and probably as permanent abiding place for the yellow-fever poison; in making new sewers where needed; and, if practicable, in frequently flushing the sewers and washing the street during the dry season.

XII.—EXAMINATION OF THE AIR.

That yellow fever is usually contracted by respiring, in infected localities, a poisoned atmosphere seems beyond question; and many things in the behavior of the specific poison of the disease, such as its portability, the tenacity with which it clings to surfaces, clothing, &c., seem to prove that it is particulate. There is therefore reason to hope that it may be eventually demonstrated by the microscope. In Havana various methods were resorted to for the purpose of collecting the suspended matters in the atmosphere for microscopic examination. At first the method by aspiration was adopted, and ninety permanent preparations were made from eighteen different localities by passing a considerable quantity of air through a few drops of glycerine jelly or acetate of potash solution and mounting these liquids in shallow cells of white-zinc cement. These preparations show many things very satisfactorily, but for immediate examination the simpler method of exposing a clean glass slip for forty-eight hours in a place protected from currents of air was found to give more interesting and varied results.

Common experience proves how quickly dust accumulates upon exposed surfaces in dwellings, hospitals, &c., and Professor Tyndall has shown that in a closed apartment where there is no disturbance of the atmosphere all the suspended matters soon settle to the floor of the chamber, leaving the air as free from particulate contents as if it had been filtered through a cotton filter. This is proved by the fact that a beam of light passed through the chamber, not meeting with reflecting surfaces, does not have a luminous path.

Upon the glass slips exposed in Havana in the yellow-fever wards of hospitals, in the laboratory of the commission, and on infected vessels, the dust deposited was found to contain a variety of vegetable organisms, and numerous extremely minute crystals, in addition to the amorphous mineral and vegetable matters, epithelial cells, &c., which make up the greater part of the dust found everywhere.

Attention was particularly attracted to certain slender glistening acicular crystals radiating from little opaque masses, which were especially abundant in the yellow-fever wards and in the soiled-linen room of the military hospital. Subsequent observations in the United States have added to the interest which these striking objects aroused when first seen. Soon after the return of the commission the National Board of Health had a session in Washington, and several of the members on returning to their homes took with them some watch-glasses arranged in little boxes, so that they could be conveniently packed and sent by mail. These watch-glasses were exposed in various places, and returned to Washington for microscopic examination of the dust deposited upon them. They were received in good order, and had adhering to the concave surface of each glass a deposit of dust more or less abundant, according to the place of exposure. Seven boxes, each containing two glasses, were received from infected localities, viz, two from Morgan City, La., four from Centreville, La., and one from Bayou Boeuf.

Of these, six pairs of glasses had been exposed in the rooms occupied by yellow-fever patients, and one pair outdoors in an infected locality. All of these glasses were found to have adhering to them a considerable number of radiating acicular crystals, exactly similar in appearance to those discovered in Havana. Eight boxes were also received from places supposed to be not infected, viz, four from Bellevue Hospital, New York, and four from Charity Hospital, New Orleans. The watch-glasses inclosed in these boxes had been exposed in the wards of these hospitals, and in the dead-house and soiled-linen room of Charity Hospital. All were well covered with a deposit of dust, and none of those from New York presented any appearance of crystals. The glasses from New Orleans, however, had a very few of the acicular crystals described and a considerable number of prismatic crystals, exactly resembling crystals found in Havana upon glass slips exposed in the laboratory and in the Military Hospital. Whether these and the prismatic crystals are different substances or different forms of the same substance, whether they, one or both, bear a causal relation to yellow fever, whether they are present in the atmosphere in greater abundance during the prevalence of yellow fever without being the true poison of the disease, or whether they are entirely independent of this disease, are questions to be determined by future investigations. But the facts already presented, and the additional fact that no description or figure of anything like these acicular crystals is to be found in the amply illustrated reports of Maddox, Cunningham, Miquel, and others, make it imperative that the investigation be pursued until these questions are answered. Crystals deposited from the atmosphere are mentioned both by Cunningham and Miquel, and prismatic crystals are figured by the latter writer, which may be identical with those of similar form found in Havana. But the elongated, flexible, acicular crystals shown in photo-micrograph No. 204 from Havana and No. 1 from Morgan City are so peculiar and striking that these careful observers could scarcely have failed to describe and figure them if they had found them during their researches. At first it was a matter of doubt whether these slender, glistening filaments were vegetable or crystalline in character; but the fact that they dissolved instantly when brought in contact with water is taken as conclusive evidence that they are not vegetable structures.

It is hoped that the plan of investigation commenced in Havana will be continued under the auspices of the National Board of Health until the desired result is attained, or until an exhaustive research proves that the general plan and the methods employed are not competent to cope with the difficulties of the problem. An essential part of the plan consists in making a photographic record of everything found in the atmospheric dust deposited upon clean glass slips exposed in infected localities, for comparison with photographs and drawings of similar objects from non-infected places. Such photo-micrographs show very well all minute and transparent objects; they are more quickly made than drawings, and can be sent to experts in all parts of the world for study.

The mycologists and algologists will thus be able to point out common fungi and algæ, so that attention need only be given to undescribed species. A series of photo-micrographs, all made with the same magnifying power, admit of comparisons and accurate measurements being made with an ease and quickness which should do much toward facilitating the drawing of morphological distinctions. The plan includes also elaborate culture experiments, but, owing to want of time, very little was done in this direction in Havana. In addition to all this, it seems very desirable that the resources of chemistry should be brought to bear upon the difficult problem. If the poison present in the air is not changed or destroyed by water, and there appears to be no good reason why it should be, it seems as if it ought to be possible to obtain a sufficient quantity to determine its nature by passing a large volume of air through a small quantity of water. Whether the problem will eventually be solved by son such simple expedient as this, or whether the combined resources of chemistry, met orology, and physiology must be brought to bear upon it, it seems unquestionable th it is in the atmosphere that the subtle and deadly yellow-fever poison must be sough In this connection attention is respectfully invited to the experiments of Dr. Charl Finlay, of Havana, which seem to prove an increased amount of volatile alkali (*am moniaf*) in the atmosphere of Havana during the prevalence of yellow-fever. His r port is appended.

XIII.—MORBID ANATOMY AND PATHOLOGICAL HISTOLOGY.

In the division of labor made by the commission at the outset of the investigatio this portion of the work was assigned to Dr. Guiteras, who reports as follows:

Twenty-two autopsies have been performed during the months of July, August, an September, 1879. Of these eighteen have furnished material for histological studie All the post mortems but two were performed at the military hospital of San Ambr sio. The diagnosis of the disease was confirmed in every case by the attending phy sician, and frequently also by the director of the hospital. In this institution the ma terial for the study of the morbid anatomy of yellow fever is amply sufficient. Th commission has met with no obstacles in the discharge of its duties, both because the favorable disposition of the physicians in charge and because of the absence of a fears of contamination on the part of the community.

Rather than conclusions, the statements presented in this report should be consid ered as suggestions brought forward by a preliminary examination which your com mittee expect to substantiate after further investigation.

The organs that have been prepared for examination are: The liver, stomach, an intestines, the kidney, the supra-renal body and the spleen, the spinal cord, the medull oblongata, the meso-encephalon, the pneumogastric nerve, and the semi-lunar gang lion of the abdomen, the heart and other muscles, the mesenteric glands, and th lungs.

The tissues from fourteen of the cases are already cut and ready for mounting. O the first eight cases a number of sections have been mounted (144) and accompany thi report.

1. *The liver* has been found always to be of about the normal size and consistency Its color in the majority of the cases light, the exceptions being one case of chroni cirrhosis and two cases in which the lungs were found studded with hemorrhagic foci. The lesion constantly found in the organ by microscopic examination is the so-calle parenchymatous inflammation of Virchow. The hepatic cells are found in a conditio of cloudy swelling. Besides the fine albuminous granulation, the cells show at time evidences of fatty degeneration and pigmentary infiltration. As in other cases of parenchymatous inflammation, here also the connective tissue is found to partake of the general nutritive change. It is swollen and presents some embryonal cells. This is very apparent in one case where the lesion occurs in a liver previously affected with chronic cirrhosis. In this case the adult connective tissue is abundantly infiltrated with young inflammatory tissue.

The larger biliary passages are found patulous throughout, and the smaller ducts present no evidences of catarrhal inflammation; so that if any obstruction exists in the latter it is due to the cloudy swelling of the hepatic cells and the interlobular connective tissue. It has been supposed that the jaundice may be due to diminished pressure in the portal circulation; yet, in spite of the depletion by hemorrhage from the portal radicles, the interlobular veins are found sometimes choked up with blood. No microphytes have been found in the liver or in the blood contained in its vessels.

2. *The stomach* presents no evidences of inflammation. The protoplasm of the epithelial cells is normal, and the nuclei quite distinct. There is no degeneration of the muscular coat. It is very difficult at first to find the source of the blood found in the black vomit. The reason is this: that the tops of the ridges between the gastric follicles are removed by post-mortem digestion, and it appears that the hemorrhages take place always, as far as I have seen, from the loops of capillaries that rise into these ridges. The post-mortem digestion removes therefore the hemorrhagic foci that could lead us to detect the points of hemorrhage. In some of the preparations, especially those stained with hæmatoxylon, where those tops remain, small hemorrhagic infarctions may be detected close under the free surface of the mucous membrane. In confirmation of this supposed action of post-mortem digestion may be mentioned the fact, which was to be expected, observed by Dr. Sternberg, that the black vomit examined ante-mortem presents scarcely any cylindrical epithelium, while the fluid contained in the stomach after death is crowded with it.

3. *The kidney.*—No autopsy has been made before the third day of the disease. In all cases the epithelial cells are more or less in a state of cloudy swelling. Sometimes they seem to be large enough to obstruct the lumen of the tubules. In every kidney, however, some tubules are met with which appear to be in a normal condition. In

some of them, on the contrary, there are evidences of catarrhal inflammation; some young cells are met with displacing the older ones, and some round cells are found between the tubules. Not infrequently yellow casts are encountered, choking up the caliber of the tube. The blood vessels, especially toward the cortex, are quite frequently distended with blood. Some of the tubules also contain masses of coagulated blood. No organisms have been found in the kidney.

4. *The heart.*—The examination of this organ shows that there is no foundation for the opinion that there is a fatty degeneration of the muscular fiber. The heart is almost always found firmly contracted, and its consistency and color are normal. The striations are always distinct and only in some of the fibers a few fatty granules are found in the neighborhood of the nuclei. The *rectus muscle* and the *diaphragm* are found in normal condition.

5. *The semi-lunar ganglion.*—Connective tissue of new formation is here met with to a greater extent than in the tissues heretofore described, but the nervous elements present no evidences of degeneration further than the cloudy swelling already described in other organs.

Of the other portions of the nervous system, which have not been examined microscopically, it may be said that they present nothing abnormal to the naked eye.

APPENDUM.

Report on the alkalinity of the atmosphere observed in Havana and other localities of the island of Cuba. By Charles Finlay, M. D., of the Havana yellow-fever commission. (Spanish commission.)

Considering as proven facts that the material cause of yellow fever, whatever its source may be, exists, disseminated or volatilized in the atmosphere surrounding the centers of infection, that the city of Havana constitutes a permanent center of that kind, and that most of the other localities of the island of Cuba are readily converted into similar centers, it seems natural that attention should be called to a peculiarity of the Cuban atmosphere, which for years past has been noticed by the writer of the present report; the more so as the variations so far observed in the manifestations of that peculiarity seem to keep pace with the intensity of yellow fever in the city of Havana in the different seasons of the year. The peculiarity referred to was first observed by the writer in the year 1858, and consists in the property presented by the atmosphere of Havana of restoring the blue color to a solution of litmus previously reddened by an acid, and bringing back the violet tint to an acidulated solution of logwood extract. This reaction is what all chemists recognize as the exterior characteristic of alkaline substances, to distinguish them from acids. The process which the writer at present employs in order to measure the atmospheric alkalinity requires the following apparatus and reagents:

First. An aspirator of two or three liters capacity, with a gauge, to enable the observer to read off the cub. cent. of air aspirated.

Second. Three test-tubes of the same caliber, and fitted with a cork perforated so as to admit two glass tubes—one straight, for the ingress of the external air, the other bent, for connection with the aspirator.

Third. Two graduated pipettes, divided in fractions of cub. cent.—one used in measuring out the graduated acid, and the other reserved for the lime-water.

Fourth. A graduated solution of sulphuric acid, of such strength that ten cubic centimeters represent 5.365 milligrammes of monohydrated sulphuric acid, and exactly neutralize 0.3063 of lime.

Fifth. A solution of lime in distilled water filtered while boiling hot, and of which five cubic centimeters exactly neutralize ten cub. cent. of the above acid.

Sixth. A weak solution of litmus of a violet tint, for which some three grammes of cake-litmus, one liter of distilled water, and a few drops of sulphuric acid are generally employed—practice soon teaching the degrees of transparency and of acidity best adapted to insure rapidity and accuracy in the result.

Provided with these apparatus and reagents, proceed as follows:

Label the three test-tubes, *e. g.*, "Litmus," "Air," "Lime." Drop into the two labeled "Air" and "Lime" one cubic centimeter of the prepared acid in each. Add about ten cubic centimeters of the normal litmus solution, or such quantity as will show a sufficient contrast to the normal litmus, yet not presenting too light a red, but retaining a light shade of violet, so as to avoid any excess of free sulphuric acid in the litmic solution, being careful to use the same quantity in both test-tubes, so as to obtain identical tints. Now connect the test-tube labeled "Air" with the aspirator, and observe the change of color in the acidulated litmus while the air is being aspirated through it until it becomes again identical with the original litmus kept for comparison in the third tube, labeled "Litmus." Note the quantity of air required to effect the change, and from that result reckon the amount of acid which would have been neutralized by one cubic meter of air. The experiment might stop here;

but as a further proof that the acid has been properly measured and retains its orig nal strength, try how much lime-water will be required to effect in the other te tube, "Lime," the same change as that produced in the tube "Air" by the atm pheric air. Such is the process which I employed before our auxiliary commission our meeting-room on the 27th September last, and by the same process I have co pared the different acids which I had previously employed, correcting the results means of the lime-water test—a matter of considerable importance, as without it t alkalinity estimates are apt to be exaggerated.

In the adjoining table are figured the results of the alkalimetric observations tak by the writer in the city of Havana at various times from 1864 to 1879, as also tho of the late Francis A. Sauvalle, vice-president of the Havana Academy of Sciences, Regla and Guanabacoa, in 1873, and of Dr. Guiteras, of the United States yellow-fev commission, in Matanzas and San Augustin, in September, 1879.

In order to show the colossal proportions of these figures as compared with the alk linity which would result from the free ammonia found in the atmosphere of oth localities, it will be sufficient to record the following results, quoted by Parkes fro Dr. Chamont's report on the ventilation experiments at St. Mary's Hospital, Paddingto The last column of this table may be compared with the Havana observations, repr senting, as it does, in fractions of a gramme, the quantity of monohydrated sulphuri acid which would have been neutralized by all the *free ammonia* found in one cubi meter of air. The *maximum* value obtained in the hospital wards in July, 1875, wi thus be seen to be nearly 2,000 times smaller than the Havana maximum of 1879, an 228 times smaller than the Havana minimum in October, 1864.

July, 1875.	Free ammonia per cubic meter of air in grammes.	Corresponding SO_3HO neutralized by free ammonia in grammes.
External air	0. 0003574	0. 001030
Wards	0. 0006680	0. 001930
Wards	0. 0006669	0. 001920
Wards	0. 0003519	0. 001010
August, 1876.		
External air	0. 0000163	0. 000047
Wards	0. 0000497	0. 000143
Wards	nil.	nil.
Wards	0. 0000310	0. 000089
Wards	0. 0000127	0. 000037
Wards	0. 0000100	0. 000029
Average	0. 00021639	0. 00062

Practical deductions would evidently be premature in the present state of the inquiry, yet it is believed that enough has been proved to induce a systematic investigation to be instituted in order to compare the alkalinity of various localities at different seasons of the year with regard to the influence of that condition on the development of yellow fever. In the mean time the following considerations seem to support the view of a probable connection between the prevalence of yellow-fever epidemics and atmospheric alkalinity:

First. The high figures of atmospheric alkalinity in Havana coincide with the greatest intensity of yellow fever in that city.

Second. In the pathology of yellow fever it has been found by Dr. Blair, and since verified by other observers, that the blood, the breath, the perspiration, and the vomited matters (at certain periods of the disease) are markedly alkaline, owing to the presence of an excess of volatile alkali.

Third. Some of the most remarkable symptoms of yellow fever bear a strong analogy to those of gradual intoxication by volatile alkali, such as ammonia; *e. g.*, hemorrhagic tendency, scorbutic condition of the gums, albumen found (post-mortem) in the urine, gastric irritability, as observed by Dr. Richardson (on the coagulation of the blood), Christison (on poisons), Orfila, and others.

Fourth. The poison of yellow fever is considered by such an authority as Dr. Barkes to have existed in some cases in sewer air, whereas Odling's observations show that the putrid substance in sewer water appears to be allied to the compound ammonias, and contains less carbon than ethylamine and more than methylamine, thus corroborating the conjecture that the yellow-fever poison may itself consist in such a chemical compound, for the development of which an ammoniacal condition of the atmosphere may be considered as a highly predisposing, perhaps essential, circumstance.

Fifth. Among the disinfectants recommended against the yellow-fever infection, only acid substances are mentioned, and the most efficacious is believed to be nitrous-acid fumes, as would also probably be the case in the supposition of a volatile alkali being the agent to be destroyed.

Sixth. Finally, the various empirical treatments practiced in the West Indies by non-professionals have always had oily and acid substances for their foundation, just as if the object in view consisted in saponifying or neutralizing some alkaline poison introduced in the system.

The general deductions which result from the alkalimetric observations contained in the adjoining table may be summarily condensed in the following propositions:

(*a.*) The Havana atmosphere is constantly alkaline.

(*b.*) The alkalinity is strongly marked and increases from May to August, decreases from September to December, and remains low from January to April or March.

(*c.*) Even in the months of low alkalinity it now and then happens that a comparatively high figure is occasionally observed, but the general truth of the above proposition does not seem to be materially affected as regards the average and maximum curves.

(*d.*) In all parts of the island where the alkalinity has been tried it has been found to exist, though always inferior to that observed in the city of Havana at the same seasons of the year. The number of observations on this point is, however, too limited to warrant any general deduction.

(*e.*) A tendency is observed on the part of the volatile alkali of the Havana atmosphere to form acid salts whenever the accidulated litmus contains an excess of free sulphuric acid, thereby showing the alkali to constitute a weaker basis than simple ammonia—more likely some volatile alkali of the compound ammonia type.

APPENDIX C.

ORGANIC MATTER IN THE AIR.

BY Prof. IRA REMSEN, *of the Johns Hopkins University, Baltimore, Md.*

PRELIMINARY REPORT ON AN INVESTIGATION CONCERNING THE BEST METHOD FOR DETERMINING THE AMOUNT OF ORGANIC MATTER IN THE AIR.

I herewith submit a brief report on the results of the experiments undertaken at the request of the National Board of Health for the purpose of deciding upon the best method for the determination of the amount of organic matter in the air. A full report on this subject will be presented at a later date, when the experiments, which are still in progress, have been brought to a close. The only object of this communication is to inform the board in regard to the general character of the work which has thus far been done, the results which have been reached, and the direction in which inquiry is at present being pushed.

It must be premised that, in an investigation of the kind under consideration, the greatest amount of patience must be united with the most delicate manipulation, in order that results of any value may be attained; and, even with these advantages, a very large amount of time would necessarily be involved in anything like a complete working out of the problem. It cannot be pretended that the work thus far performed puts the subject in a very satisfactory shape, but still it will be seen that a pretty firm basis has been laid for future investigation, and this, as there is reason to believe, is all the board expected when the investigation was first suggested.

The chief difficulty met with in this study consists naturally in the fact that the substances to be determined are present in the air in very minute quantity. To give an idea of the quantity, it is only necessary to say that, according to the best determinations by earlier experimenters, as well as by ourselves, there is, on the average, as nearly as can be estimated, about 0.5 gram of organic matter in 1,000 cubic meters of air. Now, the first question which it is desired to answer is, whether such minute quantities can be determined with sufficient accuracy to enable us to detect small variations in the amount present. If this were possible, it is plain that the fact would be of the highest importance to sanitary science, for it is now believed, with good reason, that these organic constituents of the air are the real mischief-breeders, and hence that the determination of the amount of organic matter in the air, provided it could be done with accuracy, would give us a much more correct measure of its impurity than any means now employed. It is still customary to determine the amount of carbonic acid (CO_2) present in the air, and from the quantities found to draw conclusions concerning the impurity of the air; but, as the carbonic acid is known not to be the really injurious constituent, the method is obviously objectionable. We may have a very impure air without carbonic acid, and a harmless air with considerable quantity of that gas.

I.—METHOD FOR COLLECTING ORGANIC MATTER FROM THE AIR.

Before anything could be done in the way of examining the organic matter, a method had to be decided upon for collecting it. To guide us in the decision we had the experience of earlier workers in the field, particularly R. Angus Smith (Journal Chem. Soc., xi, 217; Air and Rain, &c.), Chapman (Chemical News, 1870, page 65), and Moss (Lancet, 1872, page 627). The methods employed by these investigators were not entirely satisfactory, and, further, from the descriptions of the earlier experiments, it is impossible to discover whether special experiments were undertaken to show that all the organic matter is actually absorbed by the agent employed. The method last employed by Smith is very tediuos—so much so as to almost exclude its use as a practical measure. It consisted in drawing air into a vessel containing water, shaking it for some time, and then repeating this operation a great number of times, so as to secure the contact of a sufficient quantity of air with the water. It is not stated in Smith's papers whether the air that had been thus shaken with water was subsequently examined for organic matter or not; and it is questionable whether complete absorption can be effected in this way. Simply drawing the air through water is not sufficient, as Smith's first experiments showed, to secure complete absorption; and it seems also clear from Smith's statements that, if the air be drawn through a number of vessels and tubes, a considerable quantity of the substances which it is desired to obtain remains in contact with the walls of the glass vessels and tubes. It is hence necessary to avoid the use of a complicated series of vessels, and to make the collector as compact as possible.

Chapman some time ago suggested the use of pumice-stone, and actually employed it in this way: It was first ignited to destroy all organic matter that might be in contact with it, then a piece of platinum gauze was placed on a funnel, then a layer of coarsely powdered pumice-stone upon this, and finally a layer of the finely-powdered material upon this. It seemed to us desirable to diminish as much as possible the surface of the absorbent directly exposed to the air, and to increase the thickness of the mass through which the air was to be passed, so the apparatus was modified by using, instead of the funnel, a tube of three-eighths inch internal diameter, and from 5 to 7 inches long. This was drawn out at the lower end, so as to accommodate a small piece of rubber tubing, and in this form it is ready for use. After being carefully washed, it is filled with ignited powdered pumice-stone. This piece of apparatus was found to be as efficient as it is simple in construction. Several experiments were now undertaken in order to determine its efficiency.

First, the air after passing through the pumice-stone was drawn by means of an aspirator through four small flasks containing pure distilled water, and, at the end of the operation, the water in the flasks was examined for nitrogenous matter by treating it in such a manner as to convert the nitrogen into ammonia. No ammonia was obtained from it except the minute quantity originally present. Then the air was passed successively through two pumice-stone tubes, and, while the first yielded the usual quantity of ammonia, the second did not yield even a trace. These experiments were repeated with very impure air, and with the same results. The rate at which the air was drawn through the absorber was varied from the passage of 10 liters in two hours to the passage of the same amount in forty-five minutes. In all cases, however, no ammonia was obtained from absorbents placed between the first pumice-stone tube and the aspirator.

Whether the simple fact that the absorption of the nitrogenous material is completely effected by the pumice-stone is all that is necessary, is a question which will be considered in brief further on; but that all the materials which contain ammonia or are capable, either by treatment with caustic soda or with caustic soda and potassium permanganate, of yielding ammonia, are completely absorbed by the little piece of apparatus above described, is established beyond any possibility of a doubt by our experiments.

With this knowledge it is possible to undertake a definite investigation concerning the amount of nitrogenous organic matter in the air; for after the material is once in our possession, the use of Nessler's solution will enable us to determine the small quantities of ammonia obtained.

A series of experiments was now made with air from different sources in order to determine how much reliance could be placed upon the results reached. As the composition from any source is liable to vary considerably from day to day it was recognized that the only possible way in which to secure results that could safely be compared with one another was to *examine at the same time specimens of the same air*, so that parallel experiments were always carried on and the results compared. In some cases three experiments with the same air were carried on at the same time, for the purpose of more thorough verification. As an illustration of the coincidence of results reached in parallel experiments, I may give one case:

External air taken from a height of about 25 feet above the ground was drawn by means of aspirators in the usual manner through three pumice-stone tubes.

Experiment 1. There was found an amount of ammonia corresponding to 0.343 grams in 1,000 cubic meters of air.

Experiment 2. The corresponding amount found was 0.361 grams in 1,000 cubic meters of air.

Experiment 3. The amount found was 0.439 grams in 1,000 cubic meters of air.

When the very minute quantity of substance dealt with is taken into consideration the agreement in the results must be regarded as fairly satisfactory. Now, in nearly all the experiments undertaken upon this point an almost equally close agreement of results was reached. To this statement a few exceptions must be made, but in every case in which any marked disagreement was observed a sufficient reason was known.

The experiments alluded to prove then pretty conclusively: 1st, that the pumice-stone tube is an efficient apparatus for the collection of all ammoniacal or nitrogenous organic substances contained in the air; and 2d, that the ammonia yielded by the substances thus collected can be determined with a considerable degree of accuracy by the use of the method of Nessler.

It will, of course, be observed that in the above method it is not professed that all organic materials that may be in the air are included, but only those which contain nitrogen. The question still remains open whether other organic materials may not pass unabsorbed through the pumice-stone. This may be answered by passing the air which has been in contact with the pumice-stone through a solution of permanganate of potassa. If organic material is left, its presence will, in all probability, be indicated, though its quantity may not be estimable by the decoloration of the permanganate. So, too, it has been found that air contaminated with organic matter if passed through a heated tube and then into alcohol, causes a dark color to appear in the alcohol, and there seems to be some observable relation between the amount of organic matter present and the depth of the color produced in the alcohol. This fact might be taken advantage of to determine whether there is organic matter left in the air after it has passed through the pumice-stone. Experiments of this character have not yet been performed.

II.—EXAMINATION OF THE COLLECTED MATERIAL.

After the collection of the material from the air the problem of its examination becomes very similar to that of the examination of the organic matter in water. It is known that great differences of opinion exist among those who have worked on the latter problem, and it can safely be said that up to the present no satisfactory conclusion has been reached. It is not necessary to enter into the discussion as to the relative merits of the different methods which are in use, or which have been recommended for the determination of organic matter as it exists in water. It is plain that it is not of so much importance to sanitarians to know the total amount of organic matter, that is, matter containing carbon, in the air, as to know the amount of those particular organic matters which are most likely to be injurious. These are commonly supposed to be nitrogenous, on the assumption that they are derived from animal substances which nearly always contain nitrogen.

In this investigation the view that the injurious substances in the air are nitrogenous has thus far been accepted provisionally, and every effort has hence been made to determine the amount of ammonia which could be formed from the matter collected. But by means of the method of Wanklyn, Chapman, and Smith (Journ. Chem. Soc., N. S., V., page 91; Wanklyn, Water Analysis, fourth edition, 25) it is possible to divide the ammonia obtained into two parts: First, that portion which exists either as free ammonia or as salts of ammonia, called "*free ammonia;*" and, second, that which is obtained from nitrogenous organic matter by treatment with caustic soda and permanganate of potassa, called "*albuminoid ammonia;*" If all nitrogenous organic materials which occur in the air certainly yielded all their nitrogen in the form of ammonia when treated with caustic soda and permanganate of potassa, then the determination of the amount of albuminoid ammonia in the air would furnish us with a fair, though not an accurate, measure of the amount of such nitrogenous materials present. Whether this is so or not cannot be easily decided, but it is known that many organic substances containing nitrogen do not give up all their nitrogen when treated as above described. This fact detracts from the value of the "albuminoid ammonia" process, though it by no means necessarily renders it valueless. It is still possible, of course, that the very nitrogenous substances, the presence of which it is desired to discover, may be completely decomposed by the reagents employed in the

Wanklyn process. If it can be shown that in several experiments carried on simultaneously with the same air the same amount of "albuminoid ammonia" is found, and that these amounts bear a constant relation to the impurities of the atmosphere, then it would be of value. With these points in view several experiments were next undertaken, the results of which are not as satisfactory as could be desired, though they are certainly interesting as throwing light upon the value of the method employed. In parallel experiments there was usually observed a fair agreement of results, but occasionally very marked differences were met with in the amounts of "albuminoid ammonia" found in one and the same specimen of air. Thus in one series of three experiments carried on simultaneously, the following results were obtained:

In the first experiment there were found in 1,000 cubic meters air, 0.128 gram of free ammonia and 0.215 gram "albuminoid ammonia."

In the second experiment the amounts were 0.120 gram free and 0.241 gram "albuminoid ammonia."

In the third experiment the amounts were 0.157 gram free and 0.292 gram "albuminoid ammonia."

These results may be regarded as fairly satisfactory, when the delicacy of the operations involved is taken into consideration. In another case two parallel experiments yielded less concordant results, though, as usual, every precaution was taken to avoid error. The results referred to were in—

Experiment 1: 0.120 gram free ammonia and 0.345 gram "albuminoid ammonia," in 1,000 cubic meters air; and in

Experiment 2: 0.073 gram free ammonia and 0.457 gram "albuminoid ammonia."

While there are quite marked discrepancies between the amounts of free and "albuminoid ammonia" found in these two experiments, it will be noticed that the agreement in the total amounts of ammonia found is much better; the amount being in *Experiment* 1, 0.465 gram, and in *Experiment* 2, 0.530 gram.

An extended series of observations upon the point here under consideration would be necessary before complete reliance could be placed upon the results reached by the methods described. While of course the proof is not given that the "albuminoid ammonia" process as applied to air analysis is not of value, it is certain that its application must require the greatest skill, such as only a thoroughly trained chemist could command. It is hoped that, should it be possible to continue these experiments, they may lead to a more definite conclusion than any which can now be drawn. All that can at present be stated with any degree of certainty is, that the material collected in the pumice-stone absorber from the same amount of the same air gives approximately the same amount of ammonia; while the results of experiments made to divide the total ammonia into the two parts, *free* and *albuminoid*, seem to indicate that there is considerable danger of inaccuracy. In earlier experiments, especially those of Smith and Moss, more importanee seems at the outset to have been attached to the reaching of new results in the examination of different kinds of air than to the testing of the methods employed by the continued performance of parallel experiments. It is hence impossible to say how much weight should be given to the results of these experiments. Nevertheless their results are interesting, indicating as they do marked variations in the amounts of nitrogenous organic matter contained in the air under different circumstances. The labors of these investigators will be examined more critically in the fuller report to be presented later.

Apparently the most remarkable results yet reached are those recently described by W. Van Slooten (Journal American Chemical Society, I, 263), who undertook to determine the amount of *free* and *albuminoid* ammonia in the air of New Orleans during a part of the year 1878, covering the period of the yellow-fever epidemic. He found, "first, that the air was abnormally charged with 'albuminoid ammonia' during the epidemic; second, that the abnormality disappeared with the fever; third, that the atmosphere not in immediate connection with the ground was comparatively free from any abnormal variations from an average standard." It would be venturesome to accept these results without verification. The figures given by Van Slooten are certainly in accordance with the view that at the time of the epidemic the air is abnormally charged with "albuminoid ammonia." This may be true, and nevertheless it may be that no direct connection whatever exists between the epidemic and the "albuminoid ammonia." It is highly probable that in summer there is more volatile organic matter in the air than in winter; or, in general, more when the temperature is high than when it is low. Conclusions like that of Van Slooten can only be of value when it has been shown that during an epidemic there is more "albuminoid ammonia" in the air than there is at the same period of other years when epidemics are not raging.

Finally, it should be mentioned that, in attempting to answer the question whether the amount of "albuminoid ammonia" can be regarded as a safe measure of the purity of air, some experiments were performed with air contaminated by being drawn through water containing decaying meat. The odor of this air was almost unendurable, and, according to all commonly accepted notions, it could not be breathed without serious results; yet, when examined by the method used in all the other cases, a very small amount of "albuminoid ammonia" was obtained from it—rather less, indeed, than from ordinary air. These experiments were frequently repeated, and always with practically the same results. In view of the importance of these facts in connection with the subject under investigation, it will be necessary to repeat these experiments a great many times. It is also desirable to use other means for rendering the air markedly impure, and then to subject it to examination. It is proposed, if time permit, to place a dog in an air-tight box, to draw air slowly through the box, and then examine the air for "albuminoid ammonia." Similar experiments have, to be sure, already been performed, but without satisfactory results. The field of inquiry which lies before us is thus seen to be very extensive, but it is attractive, and, to a certain extent, promising. It seems not improbable that, if time and opportunity were afforded, its exploration would lead to discoveries of great importance to sanitary science. By the work briefly referred to in this report the paths have been made pretty definite, so that a continuation of the investigation appears to be desirable.

APPENDIX D AND E.

REPORT ON DETERIORATIONS, ADULTERATIONS, AND SUBSTITUTIONS OF DRUGS.

BY C. LEWIS DIEHL.

When the writer engaged to furnish the National Board of Health with a report on facts and observations relating to inferiorities in drugs, having not previously given the subject special attention, he had no clear conception of the labor involved in the task, nor of the time that might be required for its completion. As a consequence, he has found the time too short to do complete justice to the work, and his inquiries in several directions are more or less incomplete, while the compilation of the facts gathered has been more hasty than is compatible with smooth work.

In the pursuit of these inquiries it soon became evident that direct inquiry among those who were presumed to have opportunities for making observations connected with the subject would lead to no satisfactory results. The information thus gained is generally quite vague and general in its character. It is known that such or such a drug, or class of drugs, is particularly liable to be adulterated or inferior in quality, or that it is understood that the falsification of drugs is still carried on extensively. But when the particulars are asked, they are either not known or they are too indefinite to be of value. This difficulty has been experienced by all who have made inquiries in this direction, and that experienced by the writer is therefore in no way an exception. As a consequence, he has confined his inquiries mainly to observations that have been from time to time recorded, and particularly to those observations of inferiority in drugs that are on record in the current literature of the last twenty-five or thirty years. It was furthermore found that the literature upon the subject is by no means as abundant as might be supposed; that, in fact, with the exception of a few papers, mainly general in their scope, the discussion of the question of adulterations of drugs has in the United States been confined to pharmacists; and that in the "Proceedings of the American Pharmaceutical Association," which have been published annually since 1852, almost every noteworthy fact related to inferiority in drugs that has developed during the past twenty-seven years has been recorded. The reports, communications, and discussions contained in these "proceedings," together with the standard text-books of pharmacy, and the few papers above referred to, form the scanty "bibliography" appended to this report, and used in its compilation.

GENERAL FACTS RELATED TO, AND INFLUENCING THE CONDITION OF, THE DRUG MARKET IN THE UNITED STATES.

Previous to 1848, and for some years thereafter, the condition of the drug market appears to have been in a very unsatisfactory state indeed. This condition was largely attributed to the importation of adulterated and inferior drugs, which, in the absence of a law specifying a standard of quality, were freely admitted at our ports of entry. During the year mentioned Congress passed a law regulating the importation of drugs, and designed to exclude inferior and adulterated drugs and medicines; the law going into effect at the port of New York on the 15th of July. Almost immediately the wisdom of this measure manifested itself; for during the first ten months Dr. M. I. Bailey, the "special examiner of drugs" appointed for the port named, had occasion to reject about 90,000 pounds of drugs—such as rhubarb, opium, jalap, gamboge, senna, yellow-bark, iodine, croton oil, sarsaparilla, &c.; while during his entire administration of the office (from 1848 to 1857) he found it necessary to reject over 900,000 pounds of "unsafe, adulterated, and improper drugs and medicines." It is worthy of remark also, and an evidence of the beneficial effects of this wise sanitary measure, that the character and quality of the more important articles of drugs, medicines, and chemicals presented for entry from abroad soon showed decided improvement, and that the importation of inferior and worthless qualities was greatly decreased in quantity. Thus, 19,989 pounds of rhubarb were rejected by Dr. Bailey during the first seven months of his administration of the office named, while during the next two and a half years he had occasion to reject only 5,782 pounds altogether; during the first seven months 3,347 pounds of opium, and during the next two and a half years only 3,164 pounds were rejected, while 70,000 pounds of opium were admitted during the same period; and so with gamboge, myrrh, and other important drugs. At other ports of entry—at Baltimore, Philadelphia, Boston—"special examiners of drugs" appear to have been appointed about the same time as at New York, and, as far as has come to the knowledge of the writer, the experience at these ports has been similar to that of Dr. Bailey.

During the first five or six years of its application the law appears to have operated remarkably well, notwithstanding certain glaring imperfections, due undoubtedly to the hasty manner in which it was framed and passed through Congress, and which were only slightly modified by a "circular of instruction," issued to special examiners of drugs on the 4th June, 1853, by the Treasury Department, then under the Secretaryship of Hon. James Guthrie. The more important imperfections which were not affected at all by the "circular of instruction" referred to, and which, inasmuch as there has been no change in the law since its passage, still exist, may be briefly stated to be the following:

1. The failure to provide for the appointment of "special examiners of drugs," absolutely on the ground of their known qualifications for the office, and independent of political preferment or patronage.

2. The failure to make that office distinct and independent, like that of a collector, and not subservient to that officer, or, as is really the case, to the appraiser of merchandise.

3. The failure to require strict accountability for his action to the Treasury Department direct, by annual reports of the transactions of his office.

4. The failure to furnish special examiners with appropriate office facilities, and with the necessary books, chemical apparatus, and reagents.

These are among the causes that have made the "drug law" less effective than it should be, and, at periods, almost inoperative; and whatever may be the difference of opinion regarding the three last-named imperfections, there is no doubt the first named is largely responsible for the inefficient and inadequate execution of the law during certain periods of its existence. The removals from this office, up to 1857, on purely political grounds, were so numerous that the law could hardly be said to have had a fair trial up to that time, except at the port of New York; and at this port, through which nearly three-fourths of all importations of drugs were made, Dr. Bailey was also removed in 1857, strictly on political grounds—thereby depriving the service of an officer of acknowledged integrity and zeal and in every way qualified for the responsible office held by him during the preceding nine years.

The condition of things at this period in the history of the drug law may, perhaps, be best explained by the following extract from the final report of a committee on standard of drugs,* appointed by the American Pharmaceutical Association for the purpose of establishing a standard for the guidance of special examiners of drugs. After explaining certain difficulties in the way of establishing standards and advising that the subject be dropped for the present, the committee, of whom the late Prof. William Proctor, jr., was chairman, continue as follows: "The committee furthermore felt discouraged from prosecuting the work by the disregard that is paid to proper qualifications in the appointment of officers to carry out the requirements of the drug law. So glaring has this disregard on the part of the Secretary of the Treasury become that designing druggists—at one port where strict scrutiny is administered—have their importations of doubtful nature sent to another port, where a less scrupulous examiner officiates, so that they may be passed. This the committee *know* to be true, and while it continues no amount of accurate standards of quality will benefit the drug market and screen out the adulterated and deteriorated articles." And in a report on "Proposed amendments to the law regulating inspection of drugs," made in the same year to the same association,† Mr. C. B. Guthrie, chairman of the committee, referring to the system of appointment of special examiners of drugs, says: "So many changes have been made that even had good, competent officers been appointed in all cases, as they have not, they would scarcely have become well settled and obtained the requisite facilities for getting through their official duties before they would have been removed to give place to some more hungry applicant." "We are speaking of facts, well authenticated facts—not fictions, by any means. The result of these changes any one can see; if not apparent, let them look at the want of uniformity of action at the different ports, and the appearance in market of drugs not seen—some of them—before for years."

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* Proceed. Amer. Phar. Assoc., 1855, 15.

† Proceed. Amer. Phar. Assoc., 1855, 33.

The writer has had no access to records relating to the execution of the drug law of a later date than 1857, except such as have been occasionally furnished to the American Pharmaceutical Association, and relating exclusively to quantities of drugs passed or rejected at the different ports and at various periods, and such facts as are related to the rejection of drugs are given in the appendix to this report. He, indeed, has reason to believe that no records exist, except it be in the inaccessible form of manuscript in the custom-houses.

If, however, he may be allowed to offer an opinion based upon information gathered from respectable importers, jobbers, and manufacturers at some of our principal ports of entry, it is to the effect that, while the same system of appointment to the office of special examiner of drugs still prevails, more attention is paid to the fitness and qualification of applicants, and the execution of the law is in the main satisfactory, though by no means incapable of being improved and rendered more efficient by wise revision.

Another powerful factor in shaping the condition of the drug market has been the organization of pharmacists, already alluded to under the name of the American Pharmaceutical Association. The history of this association is intimately connected with that of the drug law, inasmuch as it is the direct offspring of a convention "held for the purpose of adopting a series of standards for the use of the special examiners of drugs at our different ports, whereby their action might be rendered more uniform and satisfactory." This convention was held pursuant to a call of the New York College of Pharmacy, addressed to the other colleges of pharmacy, on the 15th and 16th October, 1851, and was attended by delegates from the colleges of pharmacy of the city of New York, of Philadelphia, and of Boston. After transacting the business for which the convention was particularly called, a series of resolutions were adopted, favoring a call for a convention of delegates from all incorporated and unincorporated pharmaceutical societies of the United States, to be held during the ensuing year, for the purpose of organizing a permanent "national association"; and in compliance with these resolutions, the president, Mr. C. B. Guthrie, issued a formal call for a "National pharmaceutical convention," to meet in Philadelphia on the 6th October, 1852. This convention was duly held, attended by delegates from the Massachusetts, New York, Cincinnati, Philadelphia, and Maryland colleges of pharmacy, from the Richmond Pharmaceutical Society, and by a representative of the apothecaries and druggists of the cities of Hartford and Middletown, Conn., resulted in the organization of the "American Pharmaceutical Association," under its present title; an association which, with a single exception (1862), has since met every year, and, as already mentioned, has exerted a powerful influence in shaping the condition of the drug market.

It has done this by persistently drawing attention to abuses connected with the execution of the drug law, so long, at least, as its suggestions were not overridden by political influence and policy; by shaping, in an advisory way, standards for the guidance of special examiners of drugs; by establishing a code of ethics for the professional guidance of its members and of pharmacists in general, and by relentlessly exposing all acts in conflict therewith; by collecting information of every kind connected with and to the interest of the drug and apothecary business, and giving it publicity through the annual publication of its proceedings.

In short, it has combated everything that is corrupt, improper, or unfair in the drug business; encouraged the formation of pharmaceutical associations and colleges; established amicable relations between opposing factions, and harmonized conflicting interests. To its beneficent influence largely is due the present fair status of pharmacy in the United States. To enter somewhat more into particulars: The association soon recognized the importance of counteracting a source of inferiority in drugs that is not attributable to imports, that is caused, in one way and another, in our midst. In the report of a committee appointed "to collect such information as may be deemed valuable,"* &c., presented at the meeting of organization above referred to, occurs the following:

"Whatever may be the efficiency of the law against the importation of inferior drugs, it will not reach those at home who are disposed to resort to adulteration as a means of increasing their profits. The power of the general government ceases with the custom-house. It will be necessary in order to reach this evil effectually, as far as it can be done by legislation, to induce our State legislatures and municipal authorities to authorize some form of inspection by which delinquents can be reached; not the drug adulterater merely, but the medicine adulterater—the apothecary who scruples not to reduce the strength of standard medicines, that he may reduce his prices Whatever may be the proper course of this convention, we believe that eventually the national association should urge with all the force of its influence the enactment of State laws tending to the reformation of these evils." And in the report of a committee "to consider and report on the subject of home adulterations":* "No doubt the sophistication of drugs is as well understood in this country as on the other side of the Atlantic, and that if we could apply a remedy as general in its application, we should detect an amount equally astonishing. This is one of the arguments used by the opponents of the drug law, that medicines can be as readily adulterated here as abroad; but we contend that this is no argument against shutting out foreign adulteration."

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*Proceed. Nat. Pharm. Con., 1852, pp. 9 and 10.

The agitation in this direction resulted in the appointment of a committee on "home adulteration," which furnished several interesting reports. In 1861 a standing committee on the "drug market" was created, and reports have been received with tolerable regularity since; such reports embracing facts of quality as well as quantity and price of drugs in the market, and not losing sight of adulteration or other causes of inferiority. It soon became evident, however, that the latter subject could be handled better by a special committee, and accordingly, in 1870, a standing committee on "adulterations and sophistications" was provided for, with the good result of a number of exceedingly valuable reports. And from these various reports, as well as from the reports "On the Progress of Pharmacy,"† the known facts of inferiority in drugs have been chiefly compiled.

THE KNOWN FACTS OF DETERIORATIONS, ADULTERATIONS, AND SUBSTITUTIONS OF DRUGS.

At the outset it is necessary that we should clearly understand what constitutes a "deterioration," an "adulteration," and a "substitution," and whether these terms sufficiently cover all the "causes of inferiority" in drugs that have been and continue to be observed.

Causes of inferiority in drugs are of two general kinds—those that are brought about by *accident* and those brought about by *design*. Among the first named—the accidental causes of inferiority—must be classed the—

Deteriorations, by which we understand those natural changes for the worse which take place in drugs by age or exposure. To these changes drugs of vegetable or animal origin are particularly liable, since in many of them a slow change or decomposition, entirely beyond the control of the vender, takes place; and when, in addition to this, either from carelessness or ignorance, such drugs are subjected to improper exposure, the change is all the more rapid and fatal to good quality. Deteriorations may therefore be the result of spontaneous change to which a particular drug, chemical compound, or preparation is liable, as well as of ignorance or carelessness in its preservation. There exists, however, other accidental causes of inferiority which are not covered by the term "deterioration." These are—

Impurities and contaminations, introduced either during the collection of the drug or by the process of its manufacture. Such impurities are quite common, and are generally attributable to carelessness or ignorance, except in such crude articles of commerce, the demand and application of which justifies the presence of a certain amount of impurity. All such inferiorities, however, if material in character, can be regarded as accidental only so long as they are not recognized by the vender; for if he knowingly, and under the representation of standard quality, disposes of a drug containing an undue amount of impurity, or otherwise changed to its detriment, his act in no way differs from that of the common adulterater.

Adulterations or sophistications, the terms being synonymous, are the result of design. Perhaps the best definition of what constitutes an adulteration is that given by Dr. A. H. Hassal,‡ years ago, who says: "It consists in the intentional addition to any article, for the purpose of gain or deception, of any substance or substances the presence of which is not acknowledged in the name under which the article is sold." When we speak of an adulteration, therefore, there is no room for doubt that we refer to the intentional debasement of an article. On the other hand,

Substitutions may be caused either by accident or design, and may be defined to be the sale of one article in place of and under the name of another. It not unfrequently occurs that collectors of crude vegetable drugs fail to make, or to know, the proper distinction between species, or even mistakenly collect a plant, or its parts, entirely distinct from that intended. In such a case the substitution may be regarded clearly an accidental one; but if the drug-gatherer, or the vender, becomes aware of such a substitution, its offer for sale as the article for which it is substituted is as much an intentional substitution as is that of selling potato starch for arrowroot, or flavored corn whisky for grape brandy.

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* Proceed. Amer. Pharm. Assoc., 1855, p. 25.

† The Reports on the Progress of Pharmacy give, as the title implies, a concise account of facts and observations relative to pharmacy and its collateral branches, and have been furnished with great regularity since 1857.

‡ "Food and its Adulterations," in Lancet, 1855.

And now, having in the foregoing endeavored at some length to explain the character of the influences that have been calculated to operate favorably on the condition of the drug market, and understanding the nature of the causes that may give rise to inferiority in drugs, we may inquire into its present condition as well as into facts of inferiority that may have come to notice within a reasonable period of time. These inquiries lead to the conclusion that—

The drug market must be unqualifiedly pronounced to be fair. That is to say, not that poor and adulterated drugs are absent in the market, or that inferior medicines are not dispensed in our pharmacies, but persons who know, or who really desire to obtain articles of standard quality have very little difficulty in doing so, and, as a general rule, can be suited by respectable dealers throughout the land. On the other hand, ignorant persons or those regulating their purchases by the prices rather than by the quality, and being consequently indifferent as to the character of the dealer, are very likely to meet with low grade and adulterated goods, or, at best, are frequently supplied with goods of an indifferent character.

The principal observations of inferiority in drugs made within the past twenty-five or thirty years, though the larger number have been made during the last decade, are given below in the form of an extensive table (I). A review of this will show that the adulteration of drugs is still largely practiced. There exist certain inferiorities, however, in drugs and medicines that it is not desirable or possible to consider within the narrow limits of a tabulated statement, or which, pertaining to classes of drugs, require separate discussion; and this may be briefly done in the following:

Crude vegetable drugs.—The more important crude vegetable drugs can, as a rule, be easily obtained in the market of good quality; such, however, as are not often called for are not unfrequently more or less deteriorated in quality, and this is particularly the case with pressed goods. Supposing these drugs to be good of their kind when purchased, much depends upon the length of time required for their consumption and the judgment and care exercised in their preservation. Hence it is of frequent occurrence that an article originally of prime quality is dispensed in a deteriorated condition; and to the extent of such deterioration any preparation made from it must suffer. Furthermore, some drugs, though of good or fair commercial quality, contain more or less extraneous matter, or portions of the plant not recognized as a component, and therefore require careful garbling before dispensing or converting them into medicine. It is believed that in this direction pharmacists often fail with the officinal requirements or to meet the just expectation of the physician.

Powdered drugs.—The powdering of drugs is, unfortunately, very rarely done in our pharmacies at the present day. When done at such, however, the quality is dependent upon the same conditions as those mentioned under "crude drugs." When purchased, as is generally done, powdered drugs are often very inferior, either by being adulterated, or by the practice, which is very common, of using the less sightly and the inferior portions of the drug for that purpose. They have been known and are still known to be subject to the grossest adulterations, this being particularly true of spices and such articles as are frequently handled by grocers as well as druggists. That this practice continues, not only as to grocers' goods, but also as to those exclusively handled by druggists, is shown by the low prices at which powders are often offered; for as late as 1876 the committee of the American Pharmaceutical Association "On the Drug Market"* called attention to the fact that powders are offered at the price of, or at an inadequate advance upon, the crude drug, notwithstanding the loss occasioned in drying and powdering. The proper standard for a powder should be that it accurately represents a good quality of the crude drug, dry and freed from all extraneous matters and impurities; and if we apply such a standard pharmacists are safe only in doing their own powdering, there being but few houses that aim at so high a standard. Nevertheless, powders of fair quality within the above strictures are readily obtained from respectable dealers.

Galenical preparations.—The preparations of the shops as dispensed by some pharmacists will not bear very close scrutiny. Many of them are purchased, and owing to their peculiar character any differences in their strength or quality, whether designed or accidental, are not easily observed, and as a consequence a wide and fruitful field for dishonesty is open to the unscrupulous manufacturer or dealer.

Infusions and *decoctions*, which should be properly made from the drug, are very frequently made by simple admixture of the corresponding fluid extract and water. Numerous instances have come to the knowledge of the writer in which this has been done, and that by persons whose aim it is to sell only pure drugs and who would scorn to sell an article known to be falsified. Such persons often do not appreciate the importance of adhering to the Pharmacopœia, and thus, perhaps, from motives of convenience, are led to substitute. This want of fidelity to the Pharmacopœia in fact is a fruitful cause of variation in medicines, not to speak of inferiorities occasioned b designedly making preparations of less than the standard strength in order to sav cost and to undersell.

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*Proceed. Amer. Pharm. Assoc., 1876, 393.

Solid extracts are rarely made by the pharmacist of to-day, and while some of th manufacturers furnish unexceptionable preparations, those of others are of a ver different character, being prepared from inferior or unsalable drugs or by processes d vised for saving cost and to the injury of the product. Moreover, this class of prepar tions is very liable to vary according to the degree of care in their manufacture an preservation, and it is by no means uncommon to find extracts changed by overheatin or that have become moldy and unfit for use by exposure.

Fluid extracts come under the same category as solid extracts. While they are mor frequently prepared by the dispenser, still by far the largest proportion consumed i the product of manufacture. These, as found in the market, are good, bad, and in different in their quality, and while it is true that many manufacturers aim to suppl their patrons with preparations that shall correspond with the requirements of th Pharmacopœia, there are also many others who utterly disregard that standard. The are liable to vary in their strength both on account of quantity and quality of the dru used in their preparation, and when, in addition, the process of preparation varies wit the manufacturer, either as regards the manner of exhaustion and concentratio or the quality of the menstruum used in the extraction, we can well account for th unsatisfactory character of many of the fluid extracts furnished in our pharmacies.

Tinctures which, sad to say, are sometimes the extreme limit of pharmaceutic manipulation in some pharmacies, have been found to vary very materially in the character and quality. Doubtless much of this is due to unskillful or careless prepa ration, but it is well known and understood that certain tinctures are made to var in strength, both of drug and menstruum, in order that they may be sold cheap.

Other preparations could be mentioned which are just as liable to vary in their cha acter, but the causes are in the main the same as those that have been mentioned i connection with the above classes of pharmaceutical preparations, and it is therefor not necessary to enter into further detail. Sufficient has been said to show that th quality of medicines is not alone dependent on a supply of pure drugs by the jobbe but that according to the degree of integrity, qualification, and care of dispenser th consumer will be supplied with good or with bad medicines.

In now drawing attention to the Table I, exhibiting facts of adulterations and othe inferiorities in drugs that have been observed in recent years, some brief explanatio is necessary. As mentioned elsewhere, the "table" is compiled mainly from observa tions recorded in the "Proceedings of the American Pharmaceutical Association,' though other sources of information have not been neglected. The "table" shows after the name of the drug or medicine: 1) whether the observation was made at hom (*i. e.*, in the United States) or abroad; 2) the year in which the observation was re corded; 3) the character of the inferiority observed; 4) the name of the observer. I the observation has been recorded in reports to the American Pharmaceutical Associa tion, and the name of the observer has not been distinctly stated in such, the name o the chairman of the committee furnishing the report is given instead; but this fact i designated by appending a single asterisk (thus, *) to the chairman's name, if the report is from the committee on the drug market, or by a double asterisk (thus, **) i the report is made by the committee on adulterations.

TABLE I.—*Showing the principal inferiorities, such as adulterations, substitutions, and deteriorations of drugs, recorded in the current literature of the United States during the past twenty-five or thirty years, but more particularly during the last ten years.*

No.	Drug.	Abroad or at home.	Date.	Character of inferiority.	Observer.
	BARKS.				
1	Angustura	At home	1874	A new false bark described	J. M. Maisch.
1	....do	Abroad	1875	The same bark appears to have been observed in France, and proved to be the bark of *Esenbeckia febrifuga*, Mart.	Oberlin and Schagdenhauffen.
2	Cascarilla		1874	Spurious bark imported into England from Nassau, N. P., believed to be the bark of *Croton lucidum*, L.	E. M. Holmes.
3	Cinchona	At home	1867	The quality of commercial barks is very variable	Wm. A. Brewer.*
3	....do	....do	1871	A large quantity of poor cinchona barks in the market	J. P. Remington.**
3	....do	....do	1873	Worthless bark offered for true calisaya, and also for red bark	J. M. Maisch.
3	....do	Abroad	1873	In Austria, a bark, treated with "chinoidin," to increase alkaloidal strength, offered	Bernatzick.
3	....do	....do	1873	In France, attention is called to a false cinchona bark resembling cinchona, and believed to be derived from a species of "cascarilla." It does not appear to have been offered in the market, however.	Lemoin.
4	Cotton-root	At home	1875	A false bark, the botanical origin of which is not determined, has been offered	J. M. Maisch.
5	Elm	....do	1873	Much of the commercial powder is adulterated with starchy matter, probably flour	P. W. Bedford.*
5	...do	....do	1873	Adulterated in western market with rye-meal	J. H. Schultz.
6	Sassafras	....do	1864	The bark is not thoroughly cleaned; injured by packing while damp and careless exposure	J. M. Maisch.*
7	Wild-cherry	....do	1864	Very little of prime quality found in the market; sometimes very inferior	Do.
7	....do	....do	1874	A lot offered largely adulterated with sassafras bark	J. M. Maisch.
	HERBS, LEAVES, ETC.				
8	Belladona	At home	1863	The article found in the market during 1862–'63 uniformly of bad quality	E. R. Squibb.*
8	......do	....do	1871	Indifferent in quality, owning to bad weather during season of gathering	J. McKesson, jr.*
9	Buchu	....do	1871	A spurious variety, having a different appearance, odor, and taste, offered	Do.
10	Chiretta	Abroad	1875	Substituted by a spurious plant, supposed to be *Ophelia angustifolia*	Bentley.
11	Horsemint	At home	1875	Substituted largely by "wild basil." (*Pycnanthemum incanum*)	Wallace Bros.
12	Hyoscyamus	....do	1871	Indifferent in quality during year	J. McKesson, jr.*
12	... do	....do	1871	Containing 8 per cent. impurities, such as bay leaves, straw, feathers, oats, stone, branches from unknown plant, &c.	O. Eberbach.**
13	Senna	....do	1863	Quality of Alexandria senna generally very low; one sample contained 57 per cent. stems, stone, and dust.	E. R. Squibb.*
13	....do	... do	1868	Good Alexandria senna very scarce during the year	D. C. Robbins.*
13	... do	....do	1871	About one-half has to be garbled away from Alexandria senna, as a general rule	J. P. Remington.**
13	...do	....do	1871	All kinds of senna in the market are indifferent in quality	J. McKesson, jr.*
13	....do	Abroad	1875	Senna, obtained from *Cassia brevipes*, and destitute of purgative properties, in doses of one-half ounce, sold for "fine senna" in London market.	E. M. Holmes.
	FLOWERS, ETC.				
14	Calendula	At home	1871	Adulterated with the florets of *Tagetas erecta*	J. M. Maisch.
15	Elder	....do	1871	Frequently of very inferior quality; largely composed of stalks and deficient in florets	J. P. Remington.**

TABLE I.—*Showing the principal inferiorities, such as adulterations, substitutions, &c.*—Continued.

No.	Drug.	Abroad or at home.	Date.	Character of inferiority.	Observer.
	FLOWERS, ETC.—Continued.				
16	Pyrethrum	At home	1875	Old stock chamomile flowers ground up with pyrethrum flowers for insect powder. Very little of the imported powder genuine.	A. W. Miller.**
17	Saffron	do	1864	Most of the saffron of the market is adulterated with safflower	J. M. Maisch.*
17	do	do	1871	Chalk (23 per cent.) and gypsum noticed as adulterants several years ago	J. P. Remington.**
17	do	do	1873	Two samples of "African" saffron, composed of the florets of *Carthamus tinctorius*, L.; a third sample composed of corollas of scrophulariacum plant, which was afterwards referred by J. R. Jackson, curator at Kew, to *Lyperca crocea*.	J. M. Maisch.
17	do	Abroad	1873	"Persian cake" saffron almost entirely sophisticated, and containing but few stitchmas of genuine crocus.	Dr. H. Hager.
17	do	At home	1875	Containing 30 to 40 per cent. calendula flowers, dyed with Campeachy wood; 10 to 30 per cent. tiasic sulphate and honey.	A. W. Miller.
	ROOTS.				
18	Aconite	At home	1872	Quality of root in the market generally bad; often moldy on arrival. Many parcels partially or entirely tasteless, being probably exhausted and redried.	E. R. Squibb.
18	do	do	1873	Quality of root not entirely satisfactory	P. W. Bedford.*
19	Angelica	do	1875	The root of *Archangelica atropurpurea*, *Legusticum actæipolium*, *Aralia spinosa*, and *Heracleum lanatum* have been found as substitutes for angelica root.	A. W. Miller.
20	Arnica	Abroad	1874	One package containing 50 per cent., another only 10 per cent., of true root imported into England from Germany, the chief adulterant being the root of *Geum erblanum*. D. Hanbury met with a parcel, sold for arnica root, which contained no arnica root at all.	E. M. Holmes.
21	Belladonna	do	1874	Parcels have been met containing 50 per cent. of malvaceous roots	Do.
22	Colchicum	At home	1863	Rarely met with of good quality during the year	E. R. Squibb *
23	Cypripedium	do	1873	Admixed with the rhizomes of *Hydrastis canadensis*, and occasionally with roots of other dicotyledonous plants.	Truckenmüller.
23	do	do	1873	The rhizomes of other species of cypripedium noticed in substitution and admixture	J. M. Maisch.
24	Dandelion	do	1873	Chicory substituted	Charles Rice.
24	do	do	1873	So-called "cultivated dandelion" is nothing else than chicory	J. M. Maisch.
24	do	do	1874	So-called "American dandelion" is chicory	C. B. Allaise.
24	do	do	1875	Substitution of cultivated chicory for dandelion again noticed	F. J. Prentice.
25	Ginger	Abroad	1874	Bleached ginger, to which adhered, on the surface, as much as 2.33 per cent. of a white inorganic powder.	Chas. Rice. **
25	do	do	1875	The same observed in France, whitened with lime, and artificially bleached	Patronillard.
26	Hydrastis	At home	1876	A lot of 500 pounds, composed to the amount of about 50 per cent. of beet root (?!) and containing besides serpentaria, cypripedium, sanguinaria, may-apple root, &c., in admixture, offered in Cincinnati.	O. Eberbach.**
27	Ipecac	do	1863	Damaged lots, in some cases ship-damaged, have been found in the market	E. R. Squibb. *
28	Jalap	do	1863	Drug of the market very irregular; composed of small fusiform and very large ones, with few medium tubers, probably the more uniform selected for better markets. Jalap containing 1.8 to 3.3 per cent. of resin only, and therefore probably exhausted partially in Mexico, noticed during 1861–1863.	E. R. Squibb.
28	do	do	1868	Good, genuine, heavy Vera Cruz jalap very scarce	D. C. Robbins. *

28	....do	... do	1878	Much inferior jalap in market; under most favorable circumstances the bales contain a considerable number of spongy, light, and inert tubers, not to speak of those of small size. "The custom-house reports show that a large proportion of the jalap imported into this country comes from Europe, and only a small proportion direct from Mexico. The European, chiefly English, market absorbs the best lots, and turns the inferior ones adrift over here.	Chas. Rice.**
28	....do	.. do	1873	Ten samples of powdered jalap yielded 16, 13, 11.3, 8.2, 8, 7.2, 6.4, 4.8, 4.5, and 3.6 per cent. resin.	S. H. Ambler.
29	Orris	... do	1873	The powder containing a large percentage of rye-meal	J. H. Schultz.
30	Pareira	Abroad	1874	Composed to the extent of 50 per cent. of the stems of the plant	John Moss.
30	....do	At home	1874	The same adulteration observed in United States	J. M. Maisch.
31	Rhubarb	....do	1868	The supply in the market very ordinary in quality	D. C. Robbins.*
31	....do	....do	1868	Difficult to obtain good rhubarb during the past three years. Rhubarb rejected in the United States custom-house returned to England; there powdered with a lot of superior rhubarb, reshipped to the United States and admitted.	E. R. Squibb.
31	....do	Abroad	1869	Powder adulterated in France with turmeric	Opwyrda.
31	....do	At home	1871	Inferior rhubarb found in the market to some extent. The low price of the powder, the comparative ease with which rhubarb of good or fair quality is obtainable, leads to the inference that inferior rhubarb is largely used for the powder.	E. R. Squibb.
32	Sanguinaria	....do	1875	Turmeric substituted for blood-root in Saint Louis	A. W. Miller.**
33	Sarsaparilla	....do	1871	Quality, particularly of "Honduras," very poor; clay, pieces of foreign roots, large woody pieces of the caudex, &c., and plenty of dirt in the interior of the bundles, which on the outside appear bright and clean.	J. P. Remington.**
33	....do	....do	1876	On garbling some sarsaparilla the following admixtures, showing the carelessness of some dealers, were found: Nut-galls, matico stems; bay, belladonna, and digitalis leaves; paper, bark, straw, ipecac, may-apple.	J. J. Brown.
34	Senega	....do	1871	Considerable quantity of the stems adhering to the roots and much adhering dirt	J. P. Remington.**
34	....do	....do	1873	The same observation made	P. W. Bedford.*
34	....do	Abroad	1875	Substituted by the root of an *asclepias* in France	Patrouillard.
35	Serpentaria	At home	1863	Greater portion of that found in the market is inferior, doubtless through deterioration and bad management.	E. R. Squibb.*
35	...do	....do	1873	"Texan" or "Red River" variety substituted for true article	P. W. Bedford.*
35	...do	....do	1874	A spurious article, composed of the rhizomes of *Cypripedium pubescens*, found in the market	J. M. Maisch.
35	....do	....do	1875	Containing over 12 per cent. of golden-seal root	P. J. Milleman.
35	....do	....do	1876	A small lot contained the following substances in admixture: Fruit of ground-cherry, capsules of unknown plant, stems and leaves of serpentaria, onion peels, charcoal, snail-shells, wood, glue, ginseng, gravel.	J. J. Brown.
36	Spigelia	....do	1863	The drug being scarce, quality is of little moment so long as it can be called pink-root	E. R. Squibb.*
36	....do	....do	1871	Mixed with much dirt	J. McKesson, jr.*
36	....do	....do	1875	Substituted by the root of *Phlox carolina*	S. W. Brown; Wallace Bros.
36	....do	....do	1876	Containing 6 per cent. golden seal, small branches, straw	O. Eberbach.**
37	Valerian	....do	1863	Indifferent and bad varieties abundant	E. R. Squibb.*
37	Valerian	At home	1871	"English" valerian very bad in quality and very dirty	J. McKesson, jr.
37	....do	Abroad	1871	Mixed with the rhizomes and roots of a species of *veratrum*, probably collected with it	Bentley.
	SEEDS, FRUITS, ETC.				
38	Anise	Abroad	1875	Russian anise-seed largely composed of the fruit of *Conium maculatum*	A. W. Miller.**
38	....do	....do	1876	Mixed with granular clay; a very common adulteration	O. Eberback.**
39	Capsicum	At home	1856	Powder composed of turmeric and American capsicum	C. B. Guthrey.**
39	....do	....do	1859	Adulterated with common salt (the powder)!	C. T. Carney.**

TABLE I.—*Showing the principal inferiorities, such as adulterations, substitutions, &c.*—Continued.

No.	Drug.	Abroad or at home.	Date.	Character of inferiority.	Observer.
	SEEDS, FRUITS, ETC.—Cont'd.				
39	Capsicum	Abroad	1875	Of twenty-eight samples of powder examined in the English market only four were genuine capsicum. The adulterants found were: *Red lead*, sometimes in large quantities; *vermilion* in one sample; venetian red, brick-dust, ground rice, turmeric, salt, mustard husks.	A. W. Miller.**
39	....do	At home	1876	Containing 50 per cent. of a mixture of turmeric, wheat, corn-starch, and a little horse-radish.	Professor Harrington.
40	Cardamom	....do	1863	Short, heavy, plum capsules, rare; the long, shriveled, and inferior generally found in the market.	E. R. Squibb.*
40	....do	....do	1873	Containing orange seeds and green coffee	G. W. Kennedy.
41	Coriander	....do	1871	Crop musty and of bad odor, owing to unfavorable weather at time of gathering	J. McKesson, jr.**
42	Cubeb	....do	1859	Containing 15 per cent. of false berries of unknown origin	C. T. Carney.**
42	....do	....do	1873	Containing a large proportion of stalks; powder often very inferior	P. W. Bedford.*
43	Kamala	Abroad	1873	Found in Europe to yield 20.7 to 54.4 per cent of ash	Dr. Kemper.
44	Larkspur	At home	1875	Substituted, perhaps ignorantly, by slavesacre seeds	A. W. Miller.**
45	Lycopodium	....do	1859	Adulterated with the starch of some species of lentil	C. T. Carney.**
45	....do.	Abroad	1868	Six to seven hundred weight from Galicia, composed of the pollen of *Pinus sylvestris*	Potyka.
45	....do	At home	1871	Adulterated with starch	J. P. Remington.**
45	....do	....do	1873	Adulterated with dextrin	B. Lillard.
45	....do	Abroad	1873	Substituted by the pollen of the pine	P. Cazeneuve.
45	....do	....do	1875	Containing talc, powdered resin, and potato-starch to the amount of 8.7 per cent	H. Hager.
46	Mustard	At home	1864	Ground mustard, of English origin, in Coleman's kegs, composed of corn-starch, some potato starch, turmeric, and capsicum.	J. M. Maisch.
46	....do	....do	1876	Of eight samples of ground mustard only one pure	Professor Harrington.
47	Pepper	Abroad	1873	A number of specimens of ground pepper, examined in France, showed the presence of dried and ground parenchyma of potatoes (left as residue in the manufacture of starch), lentil flour, chalk, linseed cake, sesame seeds, and grains of paradise.	
47	....do	....do	1876	Whole pepper adulterated with acorns turned into small globes and suitably dyed. (Artificial pepper-corns, made of oil-cak, common clay, and Cayenne pepper, were already mentioned by Accum.)	Gehe & Co.
47	....do	....do	1876	Light-weight pepper made equal to the heavy sorts by macerating in salt brine. Adulterants for ground pepper are pepper-leaves, sage, rape-seed, potato, spices, capsicum, Guinea pepper, chicory, rye, laurel leaves, stones from olives, bone-dust, marine salt, and other mineral substances.	A. Winter Blyth.
	EXUDATION PRODUCTS—GUMS, RESINS, BALSAMS, ETC.				
48	Aloes	At home	1871	Socotrine aloes of good quality very scarce	J. McKesson, jr.*
49	Ammoniac	Abroad	1873	Admixed with globular, transparent pieces of quartz, varying in color	Ch. Menière.
50	Assafœtida	At home	1869	Containing sulphate of lime	J. M. Maisch.
50	....do	....do	1873	Several cases passed the New York custom-house containing an unusually large quantity of stone, and almost worthless.	P. W. Bedford.*
50	....do	do	[illegible]	[illegible]	

51	Balsam Peru	...do	1865	Having none of the characters of genuine balsam, except color and consistence, and containing no cinnamic acid.	C. B. Guthrie.**
51	...do	...do	1873	Castor oil, alcohol, and turpentine as adulterants	Chas. Rice.**
51	...do	...do	1874	Adulterated with storax	Schweikert.
52	Balsam Tolu	...do	1859	Containing 15 per cent. of common resin	Chas. T. Carney.**
52	...do	...do	1864	Spurious; composed chiefly of Burgundy pitch, evidently put up in United States, in packages resembling the original.	J. M. Maisch.*
52	...do	...do	1875	Containing common resin in large quantities	B. Bückle.
52	...do	...do	1876	Containing 63 per cent. of a balsam prepared from *Liquidambar orientale*, 11 per cent. of bark and charred ligneous matter.	R. V. Mattison.
53	Benzoin	...do	1873	Containing 25 per cent. impurities	Curtis.
53	...do	...do	1873	Hemlock bark found in admixture	J. H. Schulz.
54	Copaiba	...do	1859	"Pará" copaiba, containing 6 to 8 per cent. fat oil	Chas. T. Carney.**
54	...do	...do	1871	Factitious copaiba, manufactured in Indiana	J. P. Remington.**
54	...do	...do	1872	Containing castor oil	E. S. Wayne.
54	...do	...do	1873	Containing resin and linseed oil	T. N. Jamison.
54	...do	...do	1876	Factitious copaiba, composed of linseed oil, castor oil, turpentine, and sufficient copaiba to give odor.	J. M. France.
55	Dragon's blood	...do	1876	Apparently a mixture of oxide of iron and common resin	Henry Bretot.
56	Gum Arabic	...do	1871	The powder adulterated with sand and marble dust	J. P. Remington.**
56	...do	Abroad	1873	The whole gum adulterated with dextrine in fine grains	Dr. H. Hager.
57	Guaiac	At home	1871	The quality generally very common	J. McKesson, Jr.*
57	...do	do	1875	Containing 20 to 26 per cent. impurities	L. C. Hogan.
58	Labdanum	Abroad	1876	Mixed during the melting process with olibanum, mastic, and other resins	X. Landerer.
59	Myrrh	At home	1868	Fine qualities very scarce	D. C. Robbins.*
59	...do	...do	1868	Admixed with sulphate of lime	J. M. Maisch.
60	Opium	...do	1855	Containing 20 per cent. of foreign matter, chiefly lead; powder adulterated to the extent of 50 per cent.	C. B. Guthrie.**
60	...do	...do	1859	Powder containing less than 3 per cent. morphia	Chas. T. Carney.**
60	...do	...do	1863	Much inferior opium in the market because of the indiscriminate sale of "prize goods" by the government.	E. R. Squibb.*
60	...do	Abroad	1868	"Smyrna" opium was found to be adulterated as follows, according to variety: *Macedonian* with clay; *Angora* with pieces of wax; *Amasia* with cherry gum; *Taushanly* with extract of licorice; *Balukhissar* with fused colophony; occasionally, also, entire cakes were factitious, and evidently composed in their interior of clay and cow's dung.	Dr. C. Finckh.
60	...do	At home	1871	Containing 14 per cent. of starch	J. T. King.
60	...do	Abroad	1871	Opium (in Italy!) observed which contained 30 per cent. of green leaves, supposed to be tobacco, finely chopped, together with small, roundish balls of an undetermined substance.	Righini.
60	...do	...do	1874	Gum senegal as adulterant, in England	Stoddart.
60	...do	...do	1874	Containing 10 per cent. of earthy matter, in England	Attfield.
60	...do	At home	1874	Containing gummy matter	J. T. King.
61	Opoponax	Abroad	1875	Entirely substituted by myrrh	J. H. Marais.
62	Pitch, Burgundy	At home	1871	Very little true in the market	J. P. Remington.**
62	Pitch, hemlock	...do	1875	Spurious; supposed to be a mixture of common pitch and resin	J. A. Scheidt.
63	Scammony	...do	1860 1862	Thirty-two samples of "Virgin" scammony yielded resin, as follows: One, 25 per cent.; six, 25 to 30 per cent.; eight, 30 to 40 per cent.; five, 40 to 50 per cent.; seven, 50 to 60 per cent.; four, 60 to 70 per cent.; three (of which two were special importations), over 70 per cent. According to "Regulations of the Treasury Department," virgin scammony is admitted only when containing 70 per cent. of pure scammony resin.	E. R. Squibb.
63	...do	At home	1874	Adulterated with 23 to 29 per cent. of flour	Chas. Rice.**
63	...do	Abroad	1874	Containing guaiac resin	H. W. Jones.

TABLE I.—*Showing the principal inferiorities, such as adulterations, substitutions, &c.*—Continued.

No.	Drug.	Abroad or at home.	Date.	Character of inferiority.	Observer.
	EXUDATION PRODUCTS—Continued.				
63	Scammony	Abroad	1875	While every sample of whole scammony of the market (in England) was free from starch, every sample of powder examined contained more or less scammony-starch, and occasionally wheat-starch.	Thomas Greenish.
64	Turpentine, Canada	At home	1871	So-called "Oregon balsam" substituted and sold for balsam of fir	J. McKesson, jr.*
64	...do	...do	1874	"Oregon balsam" again noticed in the market. This is apparently a factitious article composed of resin and oil of terpentine, and flavored with oil of eucalyptus and oil of nutmeg. It could not be traced further than New York.	J. M. Maisch.
	FIXED OILS.				
65	Almond	At home	1859	"True English" oil of almonds composed principally of linseed oil	Chas. T. Carney.**
66	Cacao	...do	1873	A mixture of wax and palm oil sold in the Chicago market for cacao-butter	T. N. Jamison.
67	Castor	...do	1873	Containing 95 per cent. of whale oil	T. N. Jamison.
67	...do	...do	1875	Composed of lard oil, with a little croton oil	A. W. Miller.**
68	Cod-liver	...do	1867	Undoubtedly considerable quantities of so-called "shore-oil" substituted for cod-liver oil.	Wm. A. Brewer.*
69	Neat's-foot	...do	1873	Containing 25 to 33 per cent. kerosene oil.	Chas. Rice.**
70	Olive	...do	1871	Paraffine oils, having a fine yellow color and rendered odorless by some process, largely used as adulterant.	P. W. Bedford.
70	...do	...do	1875	"Olive oil" is bottled in New York, the cheaper grades being cotton-seed oil, the better grades oil of benne. It is mixed abroad to an enormous extent with ground-nut oil.	A. W. Miller.**
71	Palm	Abroad	1873	Containing 50 per cent. and 57.5 per cent. water	Tissandier; Hager.
72	Wax	At home	1867	Containing tallow, Japan wax, or paraffine	Wm. A. Brewer.*
72	... do	Abroad	1873	Ceresin substituted for white wax; impure paraffine, colored with turmeric, for yellow wax.	Chas. Rice.**
72	...do	At home	1875	In Philadelphia market, with paraffine to 80 per cent.; one lot of yellow wax composed entirely of black earthy matter, coated very nicely with handsome yellow wax.	A. W. Miller.**
	VOLITILE OILS.				
73	Almond	At home	1859	Sometimes composed entirely of essence of mirbane (nitro-benzole)	Chas. T. Carney.**
73	...do	...do	1873	Same adulteration observed	Chas. Rice.**
74	Amber	...do	1865	Adulterated with kerosene and with oil of turpentine	A. E. Ebert.
75	Bergamot	...do	1859	Containing 80 per cent. alcohol	C. T. Carney.**
75	...do	Abroad	1875	A factitious article, made with oil of orange, copaiba, lemon, and neroli, is said to be made in Europe and sold in large quantities.	A. W. Miller.**
76	Cade	At home	1876	Common tar flavored with oil of juniper	J. M. France.
77	Chamomile	...do	1876	Castor oil and alcohol flavored with pure oil and colored with litmus	Do.
78	Cinnamon	...do	1875	Containing oil of sassafras and oil of cloves	A. P. Brown.
79	Cloves	Abroad	1871	Containing carbolic acid (Hager) and copaiba	J. P. Remington.
79	...do	...do	1876	Containing 40 per cent. of light, oxygenated volatile oil, the nature of which has not been determined.	E. Schaer.
80	Erigeron	At home	1875	Adulterated largely with oil of turpentine	J. L. Lemberger.
81	Fennel	...do	1856	Rejected at port of Baltimore because containing much oil of turpentine	Prof. Aiken.
82	Horsemint	...do	1867	Much of that in the market fails to answer the tests of purity.	Wm. A. Brewer.*

83	Juniper berries	...do	1856	Refused entry at Baltimore because adulterated with oil of turpentine	Prof. Aiken.
83	....do	...do	1875	Containing 50 per cent. of alcohol	A. W. Miller.**
84	Lemon	...do	1856	Rejected at Baltimore; containing oil of turpentine	Prof. Aiken.
84	....do	...do	1868	Containing petroleum oil (M.); paraffine oil (D.)	Maisch; Diehl
84	....do	...do	1873	Very poor lots offered during the year.	P. W. Bedford.*
84	....do	...do	1875	One package containing 25 per cent. of alcohol; another, in addition, 40 per cent. of castor oil—both original, but probably counterfeited, packages.	A. W. Miller.**
85	Mustard	...do	1868	Containing alcohol	Cumney.
85	....do	Abroad	1875	Apparently adulterated with oil of winter-green	H. Hager.
86	Peppermint	At home	1855	Containing 50 per cent. of alcohol	C. B. Guthrie.**
86	....do	...do	1867	Much of the oil of commerce fails to answer to tests of purity	Wm. A. Brewer.*
86	....do	...do	1873	Numerous lots of tainted and tampered oil offered.	P. W. Bedford.*
86	....do	Abroad	1873	In Canada, a lot offered containing 38.18 per cent. of castor oil and 29.10 per cent. of alcohol.	Shuttleworth.
86	....do	At home	1874	Western oil adulterated with some terebinthinate hydrocarbon	C. Schulze.
86	....do	...do	1875	A 25 pound can contained but 8½ pounds of pure oil, the remainder being castor oil and alcohol in about equal proportion.	A. W. Miller.
86	....do	...do	1876	Containing 10 to 20 per cent. of oil of pennyroyal.	O. Eberbach.**
87	Rose	...do	1871	Adulterated with a mixture of castor oil and alcohol	J. P. Remington.**
87	....do	...do	1876	Containing spermaceti	A. W. Miller.
88	Rose, geranium	...do	1875	Difficult to obtain the true oil, which is substituted by the oil of *Andropogon Schoenanthus*	A. W. Miller.**
89	Santal	...do	1873	Much of the commercial oil sophisticated to some extent	P. W. Bedford.*
89	....do	...do	1873	Containing 50 per cent. of castor oil	T. N. Jamison.
89	....do	...do	1874	Thick, of weak odor, and smelling of copaiba	A. P. Brown.
90	Sassafras	...do	1867	A very considerable quantity of the oil of commerce is impure	Wm. A. Brewer.*
90	....do	...do	1875	Containing 14 per cent. of resin	A. W. Miller.
91	Verbena	...do	1875	True oil almost out of the market; everywhere substituted by oil of lemon-grass (*Andropogon citratus*).	Do.
92	Wintergreen	...do	1867	Much impure oil in the market	W. A. Brewer.*
92	....do	...do	1874	Containing 20 per cent. of chloroform	W. H. Pile.
92	....do	...do	1874	Composed of one part of true oil with four to five parts of oil of sassafras	Chas. Rice.**
92	....do	...do	1875	Containing two-thirds of its volume of alcohol; also some containing oil of sassafras	A. W. Miller.
93	Wormseed	...do	1875	Apparently containing rancid turpentine	J. L. Lemberger.
94	Wormwood	...do	1856	Containing alcohol, and on that account refused entry at Baltimore.	Prof. Aiken.
94	....do	...do	1875	Adulterated with a large proportion of oil of turpentine	A. W. Miller.**
	MISCELLANEOUS DRUGS.				
95	Agaric	At home	1875	Substituted by a species of *Agaricus*, to which a bitter taste was communicated by coating the surface with some powder of true larch agaric.	J. M. Maisch.
96	Arrowroot	Abroad	1873	Common grades of arrowroot imported into Bermuda and thence exported as true Bermuda arrowroot.	P. W. Bedford.*
96	....do	...do	1876	Tacca-starch sold as Bermuda arrowroot	H. P. Madsen.
97	Castor	At home	1855	The follicles filled with sawdust to half the weight of the castor	C. B. Guthrie.**
98	Cochineal	Abroad	1869	Five samples observed, containing 8, 12, 16, 18, and 25 per cent. of sulphate of barium, ingeniously caused to adhere to the insect.	M. Himmelman.
99	Ergot	At home	1873	Much of the small-sized ergot imported contains the ergotized grains of barley, oats, and perhaps other graminaceæ.	Chas. Rice.**
99	....do	...do	1876	A lot of powder found in the market, which was entirely factitious and bearing no resemblance to the drug.	Henry Trimble.
100	Guaiac wood	...do	1873	Of eleven samples examined only one contained resin	J. H. Schulz.
101	Honey	...do	1873	Substituted by glucose, probably flavored with the flowers of the locust tree (*Robinia pseudo-acacia*).	Chas. Rice.**

TABLE I.—*Showing the principal inferiorities, such as adulterations, substitutions, &c.*—Continued.

No.	Drug.	Abroad or at home.	Date.	Character of inferiority.	Observer.
	MISCELLANEOUS DRUGS—Continued.				
101	Honey	At home	1875	Cane, or other sugar melted in a decoction of slippery elm, or in a solution of gum or starch, flavored with West India honey and "essence" (?).	A. W. Miller.**
101	....do	....do	1876	Composed entirely of sirup made from corn starch.	J. M. France.
102	Irish moss	Abroad	1874	An admixture of 40 per cent. of *Gigartina acicularis*, L., noticed in France	J. Dalmon.
103	Musk	Abroad	1875	A caddy of 19¼ ounces "true Tonquine musk," contained only 6¼ ounces of musk, the remainder being earthy matter.	S. W. Miller.**
104	Soap, castile	At home	1863	Formerly of uniform quality; "now debased to an incongruous mixture often of filthy fats and alkalies, with as much water as science and skill can put into solid form."	E. R. Squibb.*
104	....do	....do	1871	Often contains 30 per cent., or more, of water	J. P. Remington.**
104	....do	....do	1871	Substituted by cocoanut-oil soap	A. E. Ebert.
105	Tapioca	....do	1859	An entirely factitious article, made from potato starch, imported from Liverpool	Chas. T. Carney.**
	CHEMICALS.				
106	Acid, acetic	At home	1871	Deficient in strength and containing sulphuric acid	J. P. Remington.**
106	....do	Abroad	1873	Containing manganese and iron. Vinegar, in the Liverpool market, containing much hydrochloric acid.	Chas. Rice.**
106	....do	....do	1874	Containing much sulphuric acid, deficient in strength, and containing over 8 per cent. glucose.	Do.
107	Acid, butyric	....do	1873	One-third of its weight proved to be capronic acid; *butyric ether*, probably made from this impure acid, contained much water, alcohol, acetic ether, propionic ether, and as much capronic as butyric ether.	Burgemeister.
108	Acid, citric	....do	1874	Adulterated with crystals of tartaric acid	Stoddart.
108	....do	At home	1875	Same adulteration observed in American market	A. W. Miller.**
109	Acid hydrocyanic	Abroad	1874	Eight samples of officinal and three of Scheele's acid, of the English market, all found to be deficient in hydrocyanic acid.	Chas. Rice.**
110	Acid, muriatic	At home	1873	Containing much chloride of lead	E. Scheffer.
110	....do	....do	1874	"C. P." acid containing sulphurous acid and arsenic	A. E. Ebert.
111	Acid, phosphoric	....do	1874	Containing arsenic	L. Thompson.
112	Acid, sulphuric	....do	1871	Ordinary acid adulterated with sulphate of sodium and sulphate of magnesium to increase specific gravity.	J. Fleuschner.
112	....do	....do	1871	So-called "C. P." acid containing sulphate of lead	J. P. Remington.**
113	Acid, tartaric	....do	1867	A considerable quantity of tartaric acid in Boston market adulterated with 25 to 50 per cent. sulphate of sodium; believed to have been introduced through sales of "prize goods" by United States Government.	Wm. A. Brewer.*
113	....do	....do	1874	A lot containing a large percentage of alum offered by a large manufacturing firm in New York.	Chas. Rice.**
114	Æther	....do	1863	Ordinary ether, while stronger than officinally required, is often quite unclean; stronger ether generally weaker than it should be, and often unclean.	E. R. Squibb.*
115	Æther, spir. comp	....do	1863	Of eleven commercial specimens not one, in any way, approached the officinal requirements.	Do.

117	Ammon., carbon	....do	1871	A fictitious article, made in Chicago from water of ammonia, glue, and bicarbonate of sodium, which greatly resembles ordinary carbonate of ammonium.	J. M. Maisch.
118	Ammon., liquor	...do	1871	Often of insufficient strength and quality	J. P. Remington.**
119	Ammon., sulphate	Abroad	1873	Crude article found to contain so much sulphocyanide of ammonium as to be unfit even as a fertilizer.	Chas. Rice.**
120	Antim. et pot. tart	At home	1859	Containing 21 per cent. foreign matter	Chas. T. Carney.**
120	....do	....do	1871	Containing 8 to 11 per cent. cream of tartar in admixture	J. P. Remington.**
121	Antim., sulphuret	....do	1871	Containing galena; quartz to the amount of 30 or 40 per cent.; clay, &c	Do.
121	....do	....do	1873	A lot in the western market, not containing a trace of antimony and supposed to be galena.	T. N. Jamison.
122	Bismuth	....do	1871	Antimony offered for metallic bismuth	J. P. Remington.**
123	Bismuth, subnitrate	....do	1871	Adulterated with 28 per cent. phosphate of calcium	Do.
123	....do	Abroad	1873	Nitrate of ammonium in undue quantity, from process of manufacture, as impurity	Bultot.
124	Bromine	....do	1873	Cyanogen not an uncommon impurity	Phipson.
124	....do	At home	1876	Containing 10 per cent. of bromoform	Reyman.
125	Calcium, carb. precip	....do	1871	Containing much iron	J. P. Remington.**
125	Calcium, carbon	Abroad	1875	Burnt bones substituted for prepared oyster shell	E. Heintz.
126	Calcium, chloride	At home	1871	Containing much caustic lime	A. E. Ebert.
127	Calcium, phosphate	Abroad	1873	Contaminated with lead	Chas. Rice.**
128	Iodine	At home	1873	Crude article containing 25 per cent. of saw-dust	J. P. Remington.
128	....do	Abroad	1873	Containing 28.75 per cent. of iodide of cyanogen	Dr. G. C. Wittstein.
128	....do	....do	1874	Containing 5 to 22 per cent. of water, 0.30 to 0.92 per cent. chlorine, and 0.40 to 1.11 per cent. ash.	Gaston Tissandier.
129	Iodoform	At home	1871	Containing a considerable proportion of substance—not determined—which is insoluble in ether.	J. P. Remington.
130	Iron, by hydrogen	....do	1873	A lot from one of the largest manufacturing houses in the United States, containing 30 per cent. of carbon.	Chas. Rice.**
130	....do	....do	1874	The quality of the commercial article leaves much to be desired; the proportion of metallic iron which it contains is even less than several years since.	J. Creuse.
131	Iron, chloride	....do	1873	Solution of ferric chloride, diluted with water and containing no alcohol at all, sold as tincture.	Chas. Rice.
132	Iron, iodide	Abroad	1873	The sirup contaminated with lead; traced to crude iodine employed in its preparation	Attfield; Williams; Umney.
133	Iron and quinia citr	At home	1873	Containing 4.3 to 10 per cent. quinia (should contain 16 per cent.)	P. W. Bedford.
133	....do	Abroad	1873	Of eight samples in the English market only two contained the officinal quantity of quinia, the others containing from 5 to 12 per cent.	A. W. Gerrard.
133	....do	At home	1875	So-called "English style" citrate of iron and quinia varied between 3 and 6 per cent. of quinia.	L. C. Hogan.
134	Lead, acetate	....do	1871	Containing a large percentage of nitrate of lead; composed, in another case, entirely of damaged sulphate of zinc caked so as to form lumps.	A. E. Ebert.
135	Magnesia	....do	1873	Imported heavy magnesia adulterated with Rochelle salts	R. V. Mattison.
135	....do	....do	1873	Calcined and carbonate containing iron as impurity	Chas. Rice.**
136	Magnesia, sol. citr	....do	1873	Officinal solution substituted by solution of tartrate or citrate of sodium	Do.
136	....do	....do	1871	Tartrate of sodium substituted	J. P. Remington.**
136	....do	....do	1874	Contaminated with lead, evidently derived from impurity in citric acid	F. A. Reichard.
137	Manganese, oxide	....do	1873	Generally very inferior—impure and deficient in oxide	T. N. Jamison.
138	Morphia, sulph	....do	1871	Substituted completely by some mineral substance in a western city; in New York sulphate of quinia put up in morphia bottles and sold as morphia.	J. P. Remington.**
139	Mercury, corros. chlor	... do	1859	Adulterated with common salt	Chas. T. Carney.**
139	....do	Abroad	1873	But partially soluble; supposed to be derived from residues of aniline manufacture (in France).	Bultot.
140	Mercury, ammon	....do	1874	Adulterated with gypsum	Stoddart.
141	Mercury, oxide, precip	....do	1874	Contaminated with carbonate of calcium	Dr. Godeffroy.
142	Piperin	At home	1859	Adulterated with small crystals of yellow prussiate of potash	Chas. T. Carney.**

TABLE I.—*Table showing the principal inferiorities, such as adulterations, substitutions, &c.*—Continued.

No.	Drug.	Abroad or at home.	Date.	Character of inferiority.	Observer.
	MISCELLANEOUS DRUGS—Continued.				
143	Potass., bitart	At home	1855	Cream of tartar of commerce, containing 33 per cent. carbonate of calcium	C. B. Guthrie.**
143	do	do	1859	Containing 63.33 per cent. farinaceous matter and sold as "pure" cream of tartar; another lot containing acid sulphate of sodium; another containing 25 per cent. of selenite, or sulphate of calcium, technically called the "great adulterater."	Chas. T. Carney.**
143	do	do	1873	Adulterated with corn starch	P. W. Bedford.*
143	do	do	1873	Seventeen samples, purchased mainly from respectable dealers (3 wholesale, 7 retail drug houses, the remainder grocers), were all more or less impure, containing from 6 to 44 per cent. tartrate of calcium; some, in addition, carbonate of culcium. One contained as much as 89.5 per cent. tartrate of calcium; another, 92.9 per cent. terra alba.	W. G. Rothe.
143	do	do	1873	One sample composed mainly of carbonate of calcium; another, of sulphate of calcium, a little cream of tartar, and some starch and flour.	E. Scheffer.
143	do	do	1873	A sample containing 5 to 6 per cent. tartrate of calcium, 8 per cent. ammonia alum, and 2 per cent. of starch.	G. W. Kennedy.
143	do	do	1873	A sample containing 77 per cent. alum	J. M. Merrick.
143	do	do	1874	The usual impurities reported in a large number of samples	T. C. Hussey.
144	Potass., bromide	do	1873	Containing over 5 per cent. of chloride as impurity	E. Smith.
144	do	Abroad	1873	Of ten samples in France only one pure. Contained from 10 to 15 per cent. impurities, and one even 35 per cent., consisting of carbonate, iodide, and sulphate.	Adrian.
145	Potass., chlorate	do	1873	In Belgium a lot containing 15 per cent. of bicarbonate of potassium	Bruylants.
145	do	do	1875	Lead as impurity	A. Hilger.
146	Potass., iodide	At home	1873	Containing 9 per cent., and over, of bromide of potassium	Toussaint.
146	do	Abroad	1874	Containing 10 per cent. of iodate of potassium	Stoddart.
147	Quinia salts	At home	1855	Mannite found in sulphate; in another case finely picked cotton was introduced into the bottles to increase bulk.	C. B. Guthrie.**
147	do	do	1871	Salicine substituted for quinia sulphate in Philadelphia	J. P. Remington.**
147	do	do	1873	Muriate of cinchonia put up, under Pelletier's brand, for sulphate of quinia	P. W. Bedford.*
147	do	Abroad	1873	Sulphate containing 10 per cent. of anhydrous sulphate of sodium	J. Biel.
147	do	do	1873	Sulphate of quinidia substituted for sulphate of quinia in England	Chas. Rice.**
147	do	do	1875	Containing one-third carbonate of sodium. A lot of "sulphate of quinia" exported to India, contained, according to an analysis of Howard & Sons, London, not a trace of any of the cinchonia alkaloids.	A. W. Miller.**
148	Santonin	At home	1871	Containing mica	J. P. Remington.**
148	do	do	1874	Adulterated with 22 per cent. boric acid	Dr. F. Hoffmann.
148	do	do	1875	Entirely substituted by picric acid	W. L. Harrison; J. M. Maisch.
149	Silver, nitrate	do	1859	Lunar caustic, from Kentucky, sold as pure, containing but 10 per cent. of the metal	Chas. T. Carney.**
150	Sodium, chloride	do	1874	Kanawha salt, No. 1, containing nearly 4 per cent. of chloride of barium as impurity	E. Scheffer.
151	Sodium and potass. tart	do	1871	Containing 25 per cent. sulphate of sodium	J. P. Remington.**
152	Sodium, phosphate	do	1875	Containing more than half its weight of sulphate	Dr. A. B. Lyon.
153	Sulphur	do	1871	Flowers of sulphur containing 50 per cent. gypsum	J. P. Remington.**
154	Sulphur, precipit	Abroad	1869	Containing 66 per cent. of sulphate of calcium	Prof. Attfield.

THE MODES OF INTRODUCTION OF INFERIOR AND FALSIFIED DRUGS AND MEDICINES INTO COMMERCE AND USE.

To state the facts of inferiority in drugs is, to some extent, also to point out the modes of their introduction; hence, this inquiry has, in some directions, been already answered in the preceding. This is particularly true of accidental inferiorities, such as are brought about by carelessness or ignorance, the modes of introduction of which have been made sufficiently clear by what has been already said in reference to their occurrence. The present inquiry may therefore be confined almost exclusively to the consideration of the inferiorities that are introduced designedly.

If, as has been stated before, it is difficult to secure information respecting facts of adulteration observed in the open market, how much more difficult must it be to obtain information respecting modes whereby such adulterated goods are introduced into commerce and use, particularly if we reflect that the successful introduction of falsified or inferior goods is dependent almost exclusively upon the ability of the perpetrators of such to conceal their act. The discussion of this subject must therefore be largely conjectural and based upon the character of inferiorities observed in drugs. What such inferiorities may be is shown in the table (II) immediately following this inquiry.

Adulterations have been practiced from the earliest times and in the remotest ages, and are likely to be practiced in all time to come. The motive, also, has at all times been, and will continue to be, the same—cupidity. The methods, however, are subject to change, progressing with the advance of science. Nearly sixty years ago Mr. Frederick Accum,[*] a chemist of renown, declared that adulterations were managed with all the order and method of regular trade, and that it might be distinguished as an "art and mystery." And if that was true sixty years ago, it is reasonable to assume that at the present time falsifications are practiced with the increased knowledge and facilities afforded by the rapid development of chemistry and kindred sciences. But this development also makes it necessary that the falsifications should be of a more subtle character than formerly, since it has, in like manner, led to readier methods of detection. Hence, gross methods of adulteration are now not as frequently practiced as formerly, and when practiced upon drugs are soon brought to the light.

The writer is unable to point out any establishment or locality where drugs and medicines are falsified at the present day, though the occurrence of falsified drugs in the market points out the fact that such establishments—whether extensive or not is immaterial—still exist. During former years, however, such establishments were known. Before the drug law went into operation immense quantities of spurious, falsified, and worthless drugs were imported; indeed, on the authority of Dr. M. I Bailey, nearly one-half of the drugs imported into New York before the year 1848 were of this worthless description. At that time establishments existed in various parts of Europe—in England, Belgium, Germany, France—where drugs and medicines were "prepared with a special view to their sale in the United States." In one of his reports[†] Dr. Bailey draws attention to a firm in Brussels who had erected an extensive establishment exclusively devoted to the adulteration and imitation of the most important medicinal chemicals, and whose products gave evidence of the most consummate skill. There was subsequently evidence that this same firm, or some of its members—their products being debarred from entry by the drug law—engaged in the same work in the United States. In this country the existence of establishments where adulterations are regularly practiced have been pointed out from time to time, and as late as 1871 Prof. I. P. Remington[‡] drew attention to the fact that certain wholesale houses have rooms set apart for the purpose of "mixing" powders; and one house in particular, in a western city, is mentioned, having a regularly organized adulterating department, with a foreman and all appliances necessary for adulterating. The most successful field for the adulteration is doubtless that of powdered drugs, in which, owing to their physical condition, it is often quite difficult to detect foreign admixture. Indeed, so systematic has been the practice of adulterating powdered drugs that in many drug mills regular formulas for the preparation of "pure and genuine" powders were in use (see "Pulveres," Table II), and, for aught that is known to the contrary, are still in use. In this pernicious practice all classes of trade—manufacturers, jobbers, and retailers—are often implicated, some of them sending the adulterant with the drug to be powdered, while others require a return of as much powder, weight for weight, as of crude drug sent, and then, as it were, forcing the drug miller to make up the loss occasioned in drying and powdering by some foreign and less expensive substance.

Then, again, volatile oils are still adulterated to a shameful extent. Dr. A. W. Miller, in his report on adulterations and sophistications of drugs,[§] 1875, mentions the fact that it is a common practice among small distillers of essential oils, such as cedar, hemlock, spruce, &c., to put the branches of the respective trees into the still along with an amount of turpentine proportioned to the price they expect to realize. He was also shown a full line of receipts for mixing and cheapening all the more important oils, by a person who formerly held responbible positions in two of the largest houses in Germany dealing exclusively in essential oils, while the official representative of an extensive French firm of Grasse, informed him that "all the cheap grades of lavender, rosemary, and origanum or red thyme, sent to this country, both by themselves and other manufacturers, contained at least 75 per cent. of turpentine."

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[*] A Treatise on the Adulteration of Food, 1822.

[†] Report on the Practical Operation of the Law relating to the Importation of Adulterated and Spurious Drugs and Medicines, &c., by M. I. Bailey, M. D., &c., in N. Y. Jour. Med., 1849, III, 47-64.

[‡] Report of the Committee on Adulterations and Sophistications of Drugs, Proceed. Amer. Phar. Assoc. 1871.

[§] Proceed. Amer. Phar. Assoc., 1875, 495.

It is not possible, however, within the narrow limits of this report, to enter into further particulars. Suffice it to say that inferior and adulterated drugs are introduced into commerce and use by modes which vary as much as do the causes of their inferiority. The drug-gatherer, often an ignorant or poorly educated person, and being, moreover, generally inadequately compensated for his labor, is not always careful in the selection, collection, or treatment of the drug, and thus, at the very outset, vitiates its quality. From the gatherer the drug passes into the hands of the dealer, who will assort his purchases according to the market for which they may be designed, and in this way good and inferior grades are established. The drug is now ready for the market, and upon the demand of this market, in a great measure, depends the character of the drug supplied to it. If the demand is for good drugs and there is a disposition to pay fair prices, the market will be supplied with such; but if the demand is regulated by the price rather than by the quality, then the supply will naturally accommodate itself to the demand and inferior grades will prevail. In this demand for cheap goods, in fact, lies the prime motor to all falsifications and substitutions. If the importer, in sending out his order to his agent, limits the price, so that he may compete or even undersell with a large profit, his agent, endeavoring to meet the demand, will scour the market until he finds that article that is suitable in price. He does not inquire as carefully into the history of the particular parcel purchased as he would if his action were not so limited; or where several grades of the same drug exist, he will purchase that which nearest accommodates itself to the demand; and in this way it occurs that goods of inferior or sophisticated quality reach our ports of entry, where they are subjected to the scrutiny of the special examiner of drugs, and according to the degree of vigilance of this officer, as well as of the character of the inferiority, such inferior goods may be refused entry or passed. Owing to certain defects in the law, probably also to the incapacity or carelessness now and then of the examining officers, the admittance of inferior goods is not at all infrequent; and it is a positive fact that at the present day drugs are admitted from abroad that are far from satisfactory in quality, while others are decidedly inferior or even adulterated.

By reference to Table II the causes of inferiority in drugs and medicinal chemicals and preparations will be readily understood. Admitting, for the sake of argument, that all of these inferiorities exist in our market at the present day, it is not difficult to understand how inferior drugs, whether imported from abroad or produced in our midst, are distributed in commerce and brought into use. It must be remembered that among dealers in drugs and medicines, those who have qualified themselves by a systematic course of study are the exception and by no means the rule, and that qualifications so obtained are not always a safeguard against dishonest practices. The great majority of druggists enter upon their business solely as tradesmen and with the view to making money, and being in their particular branch subject to as great temptations as those engaged in other branches of trade, they enter into competition and undersell each other until their business no longer returns a profit. Under these conditions the conscientious dealer struggles along, supplying good medicines, maintaining fair prices as best he can, eking a precarious living, or, as is sometimes the case, giving up his business in despair. It is quite different, however, with the dealer who possesses an elastic conscience, and who regards his business first from the standpoint of trade and last from that of ethics. He is bound to succeed at all hazards, and enters into keen competition. With him Peruvian bark is Peruvian bark, and rhubarb is rhubarb; and if he can buy the one for seventy-five cents or a dollar, why should he pay two dollars and a quarter for what is offered as true Calisaya bark? or, if he can obtain the other at fifty or sixty cents, why should he pay one dollar and a quarter for a select article of rhubarb? With him that manufacturer is the best who gives him the largest discount on his goods; and if, perchance, he should find that a preparation is invoiced to him at a price which is inadequate to pay for the material used in its manfacture, he marvels at the progress made in the production of pharmaceutical preparations, and becomes all the more confirmed in his view that it does not pay to make them himself. He is keen at a bargain; does not hesitate to overstock his shop with medicines of a fugitive character so he can obtain them below the market price, and, in short, regulates his purchases exclusively with a view to selling cheap. And in this he is, in a great measure, supported by the public, who fail to appreciate the fact that commerce furnishes as many grades of quality in drugs as among other articles, and that it is easier to meet competition in price than competition in quality.

Attention is now asked to Table II, showing the causes of inferiorities, of whatever nature. that have been observed in drugs and chemicals. This table is given in support of some of the views expressed in the foregoing as well as for general information. It has been carefully compiled from standard text books of pharmacy, such as the "U. S. Dispensatory," of Wood and Bache; the "National Dispensatory," of Stillé and Maisch: "Handbuch der Pharmaceutischen Praxis," of Hager; and "Pharmacographic," of Flückiger and Hanbury. While it is believed to give an accurate exhibit of causes of inferiority that deserve consideration, it has been the aim of the compilator to include only the more important substances, and to omit all those, whether important or not, that have not been known to be purposely adulterated. Such is true of many chemical compounds, which are subject only to accidental impurity, and are nowadays readily obtained in commerce in a condition of sufficient purity for the purposes of medicine. The table embraces the following points: 1. Whether the drug is imported or domestic. 2. Where it is produced. 3. Inferiorities resulting from impurities or deteriorations. 4. Inferiorities resulting from adulterations or substitutions. 5. The quality of the drug as at present attainable in the market.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
18	Acid, sulphurous	Domestic	United States	By age and exposure is converted into sulphuric acid, and also loses gaseous sulphurous acid.	Deteriorated acid sold for good.	Variable by reason of ready deterioration.
19	Acid, tannic	Both	United States and Europe.	Coloring and resinous matter.	Dextrine and mineral matters of various kinds.	Good.
20	Acid, tartaric	do	Europe, (England), United States.	Traces of sulphate of calcium and lead; not unfrequently also sulphuric acid, all from process of manufacture.	Alum, borax, sulphate and nitrate of sodium.	Generally good.
21	Acid, valerian	do	Europe and United States.	Acetic and butyric acid; amyl-valerianate, &c., all from process of manufacture.	Sulphuric and hydrochloric acid; water.	Fair.
22	Aconitum root	Imported	High mountainous regions of Europe.	Variable in strength according to period of collection. Changed by improper exposure.	The tubers of other species of aconitum, inferior in strength, are occasionally mixed with or substituted for those of *A. napellus.* The root of *Imperatoria ostruthium* substituted.	Fair.
23	Æther	Domestic	United States	Foreign etherial compounds introduced by impurities in alcohol, and insufficient purification.	Ether deficient in strenth, and impure substituted for stronger ether.	Fair.
24	Æther, acetic	Both	United States and Europe.	Acetic acid and foreign ethers introduced by process of manufacture and insufficient purification.	Water and alcohol	Often deficient in strength.
25	Agaric, alb.	Imported	Central and Southern Europe; Northern Asia.	....	Other kinds of agaric substituted.	Fair.
26	Alkanna	do	Southern Europe and Western Asia.	By exposure to sunlight the coloring matter is destroyed.	The roots deprived of the bark, which contains the coloring matter, sometimes composes a large proportion of the drug.	Variable.
27	Aloes	do	Barbadoes, Cape of Good Hope, Socotra, &c.	Extraneous impurities introduced by process of preparation.	Extraneous impurities in undue quantities. Inferior grades substituted for the more valuable.	Care must be exercised in purchasing the prepared grades, both whole and powder.
28	Althaea	do	Europe and Asia Minor	Liable to become moldy	Inferior roots whitened by lime. The roots of allied species, inferior in mucilage, sometimes substituted.	Good.
29	Ammoniacum	do	Persia and Tartary	Varies according to care of collection.	Pebbles and other extraneous matter introduced.	Fair.

10	Acid lactic	Imported	Largely in Germany	Coloring and extractive matters, undecomposed lactates, mineral salts, introduced by careless manufacture.	Mannite, sugar, gum, glycerine; tartaric, phosphoric, and citric acids.	Fair
11	Acid, muriatic	Domestic	United States	The crude acid sometimes contains arsenic and lead; nearly always iron; not unfrequently sulphuric acid, sulphurous acid, and free chlorine—all due to crude method of manufacture.	Owing to crude method of manufacture the crude acid of commerce is sometimes so inferior as to be unfit for pharmaceutic uses. Often obtained as a by-product.	So-called "C. P." acid generally of fair quality. Common acid very variable.
12	Acid, nitric	Domestic	United States	Hyponitric acid and iron; saline compound, chlorine, muriatic and sulphuric acids introduced during careless or crude process of manufacture.	Undue quantities of impurities; variation in strength.	Readily obtained medicinally pure, but rarely of the strength required by the U. S. pharmacopœia. Crude acid variable.
13	Acid, oxalic	Both	United States and Europe.	Impurities introduced by crude process of manufacture.	Binoxalate and quadroxalate of potassium. Tartaric, citric, and racemic acid—introduced probably accidentally—have been noticed.	Variable.
14	Acid, phosphoric	do	The glacial acid in Europe, particularly Germany; the diluted acid in United States.	The glacial acid may be deficient in strength, owing to the presence of water. The diluted acid may contain, as accidental impurities, sulphuric, hydrochloric, nitric, and phosphorous acid, arsenic, lead, phosphate of sodium.	The glacial acid sometimes adulterated with calcium, magnesium, or sodium phosphates; the latter in considerable amount, to give it solidity.	Glacial acid variable; diluted acid fair.
15	Acid, salicylic	Imported	Mainly in Germany; said to be made in the United States under Kolbe's patent, but the fact is not evident.	Impurities are incidental to the process of manufacture, the chief of which, according to I. Williams (1878), is cresyl-salicylic acid. Carbolic, sulphuric, and hydrochloric acids; mineral impurities and coloring compounds.	Acid of inferior quality and purity sold for pure goods.	Quality variable, but pure acid readily obtained.
16	Acid, succinic	do	Principally in Germany.	Empyreumatic, odorous, and coloring compounds.	According to Hager, very prone to adulteration. Muriate of ammonium, chloride of sodium, sulphate, bisulphate, tartrate, and bitartrate of potassium; alum; alkaline nitrates; oxalic acid and oxalates; citric acid and citrates; lactose and glucose.	Variable.
17	Acid, sulphuric	Domestic	United States	The crude acid always contains lead and nitrogen compound, introduced by the process. Sometimes, but rarely in U. S. also arsenic. The C. P. acid sometimes contains lead, owing to careless manufacture.	The crude acid sometimes contains sulphate of sodium, to increase specific gravity.	The C. P. acid is rarely as strong as required by the U. S. P. Crude acid variable in quality.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

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				Impurities and deteriorations.	Adulterations and substitutions.	
18	Acid, sulphurous	Domestic	United States	By age and exposure is converted into sulphuric acid, and also loses gaseous sulphurous acid.	Deteriorated acid sold for good.	Variable by reason of ready deterioration.
19	Acid, tannic	Both	United States and Europe.	Coloring and resinous matter.	Dextrine and mineral matters of various kinds.	Good.
20	Acid, tartaric	do	Europe, (England), United States.	Traces of sulphate of calcium and lead; not unfrequently also sulphuric acid, all from process of manufacture.	Alum, borax, sulphate and nitrate of sodium.	Generally good.
21	Acid, valerian	do	Europe and United States.	Acetic and butyric acid; amylvalerianate, &c., all from process of manufacture.	Sulphuric and hydrochloric acid; water.	Fair.
22	Aconitum root	Imported	High mountainous regions of Europe.	Variable in strength according to period of collection. Changed by improper exposure.	The tubers of other species of aconitum, inferior in strength, are occasionally mixed with or substituted for those of *A. napellus*. The root of *Imperatoria ostruthium* substituted.	Fair.
23	Æther	Domestic	United States	Foreign etherial compounds introduced by impurities in alcohol, and insufficient purification.	Ether deficient in strenth, and impure substituted for stronger ether.	Fair.
24	Æther, acetic	Both	United States and Europe.	Acetic acid and foreign ethers introduced by process of manufacture and insufficient purification.	Water and alcohol	Often deficient in strength.
25	Agaric, alb.	Imported	Central and Southern Europe; Northern Asia.		Other kinds of agaric substituted.	Fair.
26	Alkanna	do	Southern Europe and Western Asia.	By exposure to sunlight the coloring matter is destroyed.	The roots deprived of the bark, which contains the coloring matter, sometimes composes a large proportion of the drug.	Variable.
27	Aloes	do	Barbadoes, Cape of Good Hope, Socotra, &c.	Extraneous impurities introduced by process of preparation.	Extraneous impurities in undue quantities. Inferior grades substituted for the more valuable.	Care must be exercised in purchasing the prepared grades, both whole and powder.
28	Althaea	do	Europe and Asia Minor	Liable to become moldy	Inferior roots whitened by lime. The roots of allied species, inferior in mucilage, sometimes substituted.	Good.
29	Ammoniacum	do	Persia and Tartary	Varies according to care of collection.	Pebbles and other extraneous matter introduced.	Fair.

31	Ammonium, bromide	Both	United States and Europe	Bromate of ammonium	Chloride of ammonium	Good
32	Ammonium, carbonate	Imported	Chiefly in England	Occasionally empyreumatic matter. Readily loses ammonia and becomes bicarbonate.	Factitious carbonate made with bicarbonate of sodium, glue, and ammonia water.	Variable owing to ready change.
33	Ammonium, chloride	...do	...do	Ferrous and ferric chloride. Occasionally empyreumatic matter.	....	Ordinary article always impure. Purified readily obtainable of good quality.
34	Ammonium, iodide	Domestic	United States	Very readily decomposed by keeping.	Bromide, chloride, and occasionally sulphate of ammonium.	Variable owing to ready change.
35	Ammonium, nitrate	...do	...do	Chloride of sulphate	Chloride and sulphate in considerable proportion.	Good.
36	Ammonium, sulphate.	Both	United States and England.	Empyreumatic and other impurities, resulting from process, such as sulphocyanide of ammonium, &c.	Sulphocyanide in very large proportion.	Variable.
37	Ammonium, valerianate.	Domestic	United States	Liable to contain excess of acid	Fixed alkalies; sulphate, phosphate, chloride, and acetate of ammonium.	Good.
38	Amygdalæ, amara	Imported	Southern Europe and Northern Africa.	Liable to attack of insects	Sweet almonds mixed with bitter.	Fair.
39	Angustura	...do	South America	Liable to change by being badly kept.	Substituted by the bark of *Strychnos nux vomica*; also by that of *Esenbeckia febrifuga*.	Good.
40	Anisum	...do	Eastern and Central Europe, and countries bordering on the Mediterranean.	Very prone to change by exposure and dampness.	Sand, clay, and other earthy matter. The fruits of *Conium maculatum*.	Fair.
41	Anthemis	...do	Southern and Western Europe.	Very liable to change by age and exposure.	The flowers of *Anthemis arvensis*, L., *Maruta cotula*, D. C., *Matricaria chamomilla*, L., *Pyrethrum parthenium*, *Achillea ptarmica*.	Varies according to age and season.
42	Antimonii et potassæ. tart.	Domestic	United States	Tin, lead, copper, *arsenic*, chlorides, sulphates—all from careless manufacture.	Bitartrate of potassium	Fair.
43	Antimonii, oxysulph.	...do	...do	May vary with the process followed, and may contain arsenic.	....	Good.
44	Antimonii, sulphuret (native).	Imported	Europe	Naturally varies in percentage of available antimony.	Coal dust; mixtures of powdered coal and chalk.	Very variable.
45	Arnica (flowers, rhizome).	...do	...do	*Root* occasionally found with the radical leaves attached. *Flowers* liable to attack of insects and to change by age and exposure.	*Root* mixed (or entirely substituted) with that of *Genum urbanum* and other composite plants; *flowers* with other yellow composite flowers.	Good.
46	Arum	Domestic	United States	Liable to attack of insects	The roots of *Arum maculatum* substituted.	Variable.
47	Assafœtida	Imported	Persia, Afghanistan, &c.	Extraneous matter introduced by careless collection.	Earthy admixtures, sometimes to 40 per cent.; pieces of translucent gum.	Fair.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
73	Cetaceum	Imported	Pacific and Indian Oceans.	Liable to become rancid and to acquire a yellowish color if insufficiently purified.	Stearine and other solid fats as adulterants.	Good.
74	Chiretta	do	Northern India		Other species of *Ophelia* are known as substitutes, and have been occasionally brought into the market as chiretta.	Good.
75	Chloral, hydrate	Both	United States and Germany.	Hydrochloric or sulphuric acid; water. Liable to spontaneous change.	Chloral alcoholate	Good.
76	Chloroform	do	do	Often insufficiently purified, containing foreign chlorinated compounds. Liable to spontaneous change when too strong, particularly when exposed to light, with formation of phosgene gas.	Impure chloroform sold for pure.	Some manufacturers furnish a pure chloroform at fair prices. Others seem to be entirely oblivious to the necessity of furnishing chloroform of even moderate purity.
77	Chondrus	Domestic	United States and Europe.	Varies according to care in collection and preservation.	*Chondrus mamillosus*, Gr. (having, however, the same general properties), sometimes substituted.	Varies; but a good article is readily attainable at an advance over the price of the ordinary.
78	Cinchona	Imported	South America; cultivated in East Indies, Java, &c		Inferior barks are often sold and substituted for those of known value. Spurious barks were formerly met, but are now very rare. Poor barks enriched with chinioidine.	Good barks can be obtained from respectable dealers. There is, however, much inferior bark in the market, which, owing to ignorance or for other reasons, is demanded by dealers.
79	Cinnamom. and Cassia lignea.	do	Ceylon, China, and East Indies.	Both varieties vary, according to care in collection, age, and exposure.	The cheaper cinnamon barks, known by the general term "Cassia lignea," are sometimes substituted for true cinnamon. Inferior grades of cassia sold for the better grades. Powder often adulterated in various ways by spice-dealers.	Both varieties are obtainable, of good quality, according to grade.
80	Coccus	do	Mexico, Central America, West Indies, and Canary Islands.		Earthy matter, carbonates of lead, sulphate of barium, bone-black, &c., applied to the surface of the insects by means of gum-water. The fully developed females of *Coccus ilicis*, Fabr., sometimes substituted.	Fair.

60	Calcium, phosphate	do	United States principally.	Chloride of ammonium	Carbonate and sulphate of calcium.	Good.
61	Calendula	Imported	Southern Europe and the Levant.	By exposure the color changes from yellow to whitish.	Substituted and adulterated by the flower-heads of *Tagetes erecta*, L., and *T. patula*, L.	Fair.
62	Calumba	....do	Mozambique and Eastern Africa.	Not unfrequently wormeaten	*Bryonia* roots and those of *Frasera Walteri* sometimes substituted.	Good.
63	Calx, chlorinat	....do	England, principally	Liable to absorb moisture, and to lose chlorine by exposure.	Undue proportion of unchanged lime.	Good.
64	Canella	....do	West Indies and Florida.	....	The bark of *Cinnamodendron corticosum* has been substituted.	Good.
65	Cantharis	....do	Southern and Central Europe and Western Asia.	Suffers by age and exposure; liable to be attacked by mites.	Powder sometimes adulterated with euphorbium. The flies sometimes extracted with alcohol and redried. Rendered weighty with fixed oils. Admixed with other insects.	Variable on account of liability to change.
66	Carum	Both	Chiefly in Europe; cultivated to a limited extent in United States.	Liable to mustiness and other changes by exposure; may contain much chaff.	Exhausted by distillation and redried. The fruits of *Ægopodium podagraria* have been substituted.	Fair or good, according to season.
67	Caryophyllus	Imported	East Indies, tropical Africa, Brazil, and West Indies.	By age becomes inferior, loses volatile oil, &c.	Deprived of volatile oil by bisulphide of carbon, and appearance of such, as well as of old and dry cloves, restored by fixed oils. Powder adulterated with various substances.	Variable. Good quality can always be obtained at an advanced price over ordinary. Powder sometimes shamefully adulterated.
68	Cascarilla	Imported	Bahamas	Suffers by age and exposure; varies according to selection.	A spurious bark, probably from *Croton lucidus*, L., has been found admixed with the genuine.	Good.
69	Cassia fistula	... do	East and West Indies	Liable to attack of insects and to become moldy.	The pods of other species of cassia substituted.	
70	Castoreum	....do	Siberia and British North America.	....	American castor sold for true Siberian. Occasionally adulterated with mixtures of blood, earthy and resinous matter, and even substituted altogether by artificial sacs.	Variable.
71	Catechu	....do	East Indies and Ceylon.	Varies according to commercial grade, and often contains considerable quantities of extraneous matter.	Color heightened by the addition of bichromate of potassium. Clay, sand, insoluble organic deposits from vegetable infusions; occasionally alum.	Good qualities easily obtained.
72	Cera	Both	Supplies are principally produced in United States.	Honey; extraneous substances of various kinds. White sometimes insufficiently bleached.	Ceresin, paraffine, and vegetable wax from various sources used as adulterants and substitutions of white wax. The same, as well as resin, stearine, suet, and similar fats, in yellow wax. White lead and flour to increase weight.	Good.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
91	Cyprepedium	Domestic	United States	Extraneous matter; portion of stem and leaves.	The rhizome of *Hydrastis canadensis* not unfrequently in admixture.	Fair.
92	Digitalis	Imported	Europe	Liable to mustiness and other changes on exposure.	The leaves of the first year's growth substituted. The leaves of *Digitalis ochrolenca*, of species of *Verbascum*, *Conyza squarrosa*, *Symphytum officinale*, *Inula helenium*, have been substituted, probably ignorantly.	Fair.
93	Dulcamara	do	do		The cut stems of *Lonicera caprifolium*, *L. periciymenum*, and *Humulus lupulus*, substituted or admixed.	Fair.
94	Elaterium	do	Southern Europe, Persia. Cultivated in England, Erance, and Germany.	Varies considerably according to source or method of preparation.	Inferior qualities sold for preferred kinds.	Variable, but a good article can be had under certain brands.
95	Ergota	do	Europe	Deteriorates by keeping, particularly if in powder; becomes quite rancid. Liable to attack of mites.	The ergot of other gramineæ, as barley, oats, &c., sometimes substituted or admixed.	Fair, but liable to vary according to age or care in keeping.
96	erri et quinia citras	Both	United States and Europe.		Has frequently been found deficient in quinia, other cinchona alkaloids substituted for quinia.	Not difficult to obtain a properly prepared article from respectable manufacturers; but cheap" buyers can also be suited by unscrupulous manufacturers and dealers.
97	Ferri ferrocyanide	Domestic	United States	Varies according to purpose for which it is made, and consequent care.	Silica, sulphate of barium, alumina, zinc, &c.	Medicinally pure article readily obtained; but ordinary commercial article not unfrequently dispensed.
98	Ferri lactas	oth	United States and Europe.	By insufficient purification may contain casein and other organic impurities.	Calcium salts of organic and inorganic acids; gum dextrin, milk, sugar, &c.	Fair.
99	Ferri thorphas	Domestic	United States	May be insufficiently washed. Oxidized by exposure. Copper and arsenic are accidental impurities.		Fair.
100	Ferri subcarbon	do	do	Sulphate of sodium and other impurities from incomplete washing.	Variable, according to care in manufacture.	Fair.

81	Colchicum	do	Southern and Central Europe.	By age and exposure the root becomes dark or nearly black, and is said to lose strength.	Root collected at the improper season substituted.	Good.
82	Colocynth	do	Western Asia and Northern Africa.	....	The fruits of other cucurbitacean plants (*Cucumis trigonus*, Roxb., and *C. Hardwicky*) have been mistaken and substituted.	Good.
83	Conium	Both	Europe; naturalized in some portions of United States, and also cultivated.	The leaves are very liable to deteriorate by age and exposure.	The leaves of *Aethusa cynapium*, L., *Anthriscus sylvestris*, Hoffm., and different species of *Chærophyllum*, have now and then been substituted.	Variable, owing to careless keeping and age.
84	Copaiba	Imported	Tropical South America.	Varies according to age of trees and care in collection. By collectors often placed in unclean vessels.	Extremely liable to adulteration. Fixed oils, turpentine, resin, volatile oils, gurjun balsam.	Good quality obtainable from respectable dealers; but "cheap" buyers are served accordingly by unscrupulous dealers.
85	Creasotum	do	England and Germany	Liable to become browned by age, owing to insufficient purification.	Much of the commercial creasote is not obtained from wood, but from coal-tar (*Cresylic acid*). Guaiacol also substituted with carbolic acid. Tar oil and fixed oils have been used as adulterants.	Very little true, beech tar creasote in commerce.
86	Crocus	Both	Principally in Spain and France; also Austria. Sparingly cultivated in Pennsylvania.	Variable quantities of the style are often admixed with the stigmas.	Inferior saffron rendered sightly with fixed oil, chalk, sulphate of baryta, and honey to increase its weight. Calendula florets, cut pomegranite petals, florets of *Arnica montana*, colored fibers of smoked beef; dried, oiled, and dyed germs of certain graminaceæ. Partially extracted by alcohol.	Adulteration very common.
87	Cubeba	Imported	Java and Malabar	The stems (rachis) may accompany the fruits. By age and exposure loses volatile oil, &c.	The ripe fruits admixed with unripe. The fruits of *Cubeba canina*, *Piper nigrum*, *Myrtus pimenta*, in admixture; also the fruits of *Rhamnus catharticus*. Undue proportion of stems. The latter also used to adulterate the powder.	Variable; often contain a large proportion of stems.
88	Cuminum	do	Africa, Asia, Europe (Mogador, Malta, Sicily).	Prone to attacks of insects which eat the entire seed, leaving only the fruit shell.	....	
89	Curcuma	do	India	....	The powder is adulterated very frequently with farinaceous substances, such as pea-meal, &c.	The powder rarely of reliable quality.
90	Cydonium	Both	Europe, India, Cape of Good Hope, and United States.	Liable to become moldy; insufficiently cleaned.	Apple, pear, and grape seeds. The shells of a fruit, brown or colored brown, to the amount of 50 per cent.	Variable; often unclean.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
91	Cypripedium	Domestic	United States	Extraneous matter; portion of stem and leaves.	The rhizome of *Hydrastis canadensis* not unfrequently in admixture.	Fair.
92	Digitalis	Imported	Europe	Liable to mustiness and other changes on exposure.	The leaves of the first year's growth substituted. The leaves of *Digitalis ochrolenca*, of species of *Verbascum*, *Conyza squarrosa*, *Symphytum officinale*, *Inula helenium*, have been substituted, probably ignorantly.	Fair.
93	Dulcamara	....do	......do		The cut stems of *Lonicera caprifolium*, *L. periciymenum*, and *Humulus lupulus*, substituted or admixed.	Fair.
94	Elaterium	....do	Southern Europe, Persia. Cultivated in England, Erance, and Germany.	Varies considerably according to source or method of preparation.	Inferior qualities sold for preferred kinds.	Variable, but a good article can be had under certain brands.
95	Ergota	....do	Europe	Deteriorates by keeping, particularly if in powder; becomes quite rancid. Liable to attack of mites.	The ergot of other gramineæ, as barley, oats, &c., sometimes substituted or admixed.	Fair, but liable to vary according to age or care in keeping.
96	erri et quinia citras	Both	United States and Europe.		Has frequently been found deficient in quinia, other cinchona alkaloids substituted for quinia.	Not difficult to obtain a properly prepared article from respectable manufacturers; but cheap" buyers can also be suited by unscrupulous manufacturers and dealers.
97	Ferri ferrocyanide	Domestic	United States	Varies according to purpose for which it is made, and consequent care.	Silica, sulphate of barium, alumina, zinc, &c.	Medicinally pure article readily obtained; but ordinary commercial article not unfrequently dispensed.
98	Ferri lactas	oth	United States and Europe.	By insufficient purification may contain casein and other organic impurities.	Calcium salts of organic and inorganic acids; gum dextrin, milk, sugar, &c.	Fair.
99	Ferri thorphas	Domestic	United States	May be insufficiently washed. Oxidized by exposure. Copper and arsenic are accidental impurities.		Fair.
100	Ferri subcarbon	....do	......do	Sulphate of sodium and other impurities from incomplete washing.	Variable, according to care in manufacture.	Fair.

101	Ferri sulphas	do	do	Prone to oxidation and efflorescence.	Impure salt sold for the pure	No difficulty to obtain a good article.
102	Ferrum redact	Both	United States and Europe.	Liable to become oxidised by exposure.	Adulterated sometimes with carbon. Damaged article sold for good. Powdered iron sometimes sold for that obtained by reduction.	Variable.
103	Filix mas	Imported	Europe	Very soon loses its activity on exposure. Sometimes collected at the wrong season.	The rhizomes of other species of *Aspidium* have been noticed as substitutes; but, if fresh, probably do not differ medicinally.	Owing to the liability of this drug to deteriorate the oleoresin is more generally imported, and may be obtained of good quality generally. It is sometimes adulterated with castor oil.
104	Fœnum Græcum	do	Western Asia, India, East and North Africa, and Southern Europe.	Liable to become wormy	Powder often adulterated with farinaceous substances.	Fair.
105	Frangula bark	do	Europe, North Africa, and Siberia.		The barks of *Prunus*, *Padus*, and *Alnus glutinosa* have been substituted for frangula bark.	Good.
106	Galanga	do	China	Varies according to selection	The "greater galangal" (*Alpinia galanga*) is occasionally sold for the officinal drug. "False galangal" is also occasionally admixed. The roots of *Cypri longi* and *C. rotundi* are known as substitutes.	Fair.
107	Galbanum	do	Persia	Extraneous impurities; sometimes very dark.	Sand, sawdust, and impurities in undue quantity.	Fair.
108	Gambogia	do	Siam, Cochin China, and Cambodia.	Liable to vary in quality.	Adulterated in Cambodia with rice flour, sand, and the pulverized bark of the tree.	Good.
109	Gentiana	do	Southern and Central Europe.	Liable to become musty.	The roots of other species of *Gentiana* sometimes collected, but have the same medicinal properties.	Good.
110	Glycerina	Both	United States and Europe.	Coloring matter, saline compound, water, &c., from incomplete purification.	Glucose, mucilage, cane sugar	Very good.
111	Granati radix cortex	Imported	Cultivated in Southern Europe and sub-tropical countries generally.		The bark of the stems and branches substituted for that of the root. Barberry, boxwood, and mulberry bark are mentioned as adulterants.	Good.
112	Guaiaci resin	do	West Indies and Northern South America.	Extraneous matter, pieces of bark, &c., introduced during collection.	Colophony; extraneous substances added to increase weight.	Good.
113	Helleboris (nigra)	do	Europe		The rhizomes and roots of other ranunculaceous plants, particularly Actæa spicata, are admixed with black hellebore.	Good.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
138	Mel	Both	United States and West Indies.	West India honey contains much extraneous matter, and requires straining.	Starchy substances; glucose prepared from grain. Sometimes entirely artificial.	Good honey is always obtainable from respectable dealers.
139	Melissa	do	Southern Europe; cultivated in United States.	Liable to lose volatile oil by age and exposure.	The leaves of *Nepeta cataria* L., var. B *citriodora*, have been at times substituted.	Good.
140	Mezereum	Imported	Europe	Liable to injury by exposure to dampness and by age.	The barks of other species of *Daphne* have been at times substituted.	Good.
141	Monarda	Domestic	United States	Liable to lose volatile oil by exposure.	Wild basil (*Pycnanthemum incanum*, Mich.), sometimes substituted in Pennsylvania.	Good.
142	Morphia and salts	Both	United States and Europe.		Morphia salts have at times been subject to the grossest adulterations and substitution by other saline compounds that are similar in appearance, such as quinine, &c.	No difficulty to get perfectly reliable morphia salts.
143	Moschus	Imported	Central Asia		Musk in grains is often adulterated, and even entirely substituted, by foreign substances simply flavored. The bags are sometimes deprived of part or their entire contents and other substances introduced.	Good musk can be obtained without difficulty; but careless or ignorant buyers may purchase inferior or artificial musk, there being all kinds of the latter in the market.
144	Myristica	do	India, West Indies, and South America.	Both nutmegs and mace vary according to selection, age, and care in preservation.	"False nutmegs," from myristica fatua, are substituted. The seeds of *Torreya californica*, Torr., known as "California nutmeg," are mentioned as a substitute.	Good, according to commercial grade.
145	Myrrha	do	Arabia and Eastern Africa.	Varies according to commercial grade and source. By age becomes dry and inferior, losing volatile oil. Impurities of an extraneous nature—sand, bark, stone.	Undue quantities of extraneous impurity. Gum arabic, cherry gum, a brown gum called "gummi brasiliense," bdellium, used as adulterants.	Fair.
146	Ol. amygd. amar	do	Europe	By age deposits benzoic acid, and becomes inferior.	Nitrobenzol, alcohol, chloroform; other volatile oils.	Fair.
147	Ol. amygd. express	do	do	Liable to become rancid	Cheaper fixed oils as adulterants and substitutes.	Good.

125	Jalapa	...do	Mexico	Varies very much in quality according to season and care in collection and selection.	The tubers of other *Ipomœas*, of *Mirabilis jalapa*, &c., are often substituted and mixed with the tubers of the true jalap. Also radix mechoacanna.	Fair.
126	Juniperus	Both	United States and Europe.	Liable to deteriorate; shrinking and losing volatile oil. Extraneous impurities are small stones, &c.	Admixed with unripe fruits, stones, &c.	Fair.
127	Kino	Imported	India	Varies according to care in collection and preparation.	Inferior grades substituted for the better.	Good.
128	Krameria	...do	South America	Varies according to selection, thick, woody roots being deficient in strength. Exposure to dampness or age readily causes deterioration.	Substituted by the roots of other species of krameria, having, however, the same general properties.	Fair.
129	Labdanum	...do	Levant	Impurities of various kinds introduced by crude method of collection and insufficient straining.	Sand, other resins, used as adulterants. Has been altogether artificially made.	
130	Lactucarium	...do	Europe	Quality varies according to care and method of preparation.	Extract sold for lactucarium	Good lactucarium readily obtained.
131	Linum	Both	United States, Europe, India.	Often contains much chaff. Ground seed liable to become rancid.	The ground seed is often adulterated with cake meal or substituted completely by such.	Readily obtained good, but not always clean.
132	Lupulin	Domestic	United States	Rapidly deteriorates on exposure. May contain sand, and portions of the hop strobiles.	Sometimes contains considerable quantities of sand and other extraneous substances.	Fair.
133	Lycopodium	Imported	Central Europe	Often insufficiently sifted, and contains extraneous portions of the plant.	Substituted by pine pollen. Adulterated with sporules of allied species of lycopodium, talc, gypsum, resin, dextrin, starch, sulphur.	Good.
134	Manganese oxide	...do	Europe	Varies according to selection; extraneous matter, such as wood, &c.	Inferior grades sold for those of higher commercial value. Adulterated or even entirely substituted by black sulphuret of antimony.	Variable.
135	Manna	...do	Mediterranean countries	Variable, according to care in collection, season, &c.	Bread crumbs, starch, glucose, flour, honey, used as adulterants. Flake manna sometimes made artificially with manna, flour, honey, and a purgative powder, molded into flakes, or purified sorts manna so molded.	Good according to commercial grade.
136	Maranta	Both	West Indies and United States.	Liable to become musty, or to acquire odor from drugs placed near it.	Other starches substituted for it	Pure Bermuda arrowroot readily obtained from respectable dealers.
137	Malico	Imported	Mexico, Central and South America.		The leaves of other plants, locally also called malico, such as *Eupatorium glutinosus*, *Waltheria glomerata*, *Artanthe lanceæfolia*, *A. adunca*, *Salvia solarea*, have been substituted.	Good.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
138	Mel	Both	United States and West Indies.	West India honey contains much extraneous matter, and requires straining.	Starchy substances; glucose prepared from grain. Sometimes entirely artificial.	Good honey is always obtainable from respectable dealers.
139	Melissa	... do	Southern Europe; cultivated in United States.	Liable to lose volatile oil by age and exposure.	The leaves of *Nepeta cataria* L., var. B *citriodora*, have been at times substituted.	Good.
140	Mezereum	Imported	Europe	Liable to injury by exposure to dampness and by age.	The barks of other species of *Daphne* have been at times substituted.	Good.
141	Monarda	Domestic	United States	Liable to lose volatile oil by exposure.	Wild basil (*Pycnanthemum incanum*, Mich.), sometimes substituted in Pennsylvania.	Good.
142	Morphia and salts	Both	United States and Europe.		Morphia salts have at times been subject to the grossest adulterations and substitution by other saline compounds that are similar in appearance, such as quinine, &c.	No difficulty to get perfectly reliable morphia salts.
143	Moschus	Imported	Central Asia		Musk in grains is often adulterated, and even entirely substituted, by foreign substances simply flavored. The bags are sometimes deprived of part or their entire contents and other substances introduced.	Good musk can be obtained without difficulty; but careless or ignorant buyers may purchase inferior or artificial musk, there being all kinds of the latter in the market.
144	Myristica	....do	India, West Indies, and South America.	Both nutmegs and mace vary according to selection, age, and care in preservation.	"False nutmegs," from myristica fatua, are substituted. The seeds of *Torreya californica*, Torr., known as "California nutmeg," are mentioned as a substitute.	Good, according to commercial grade.
145	Myrrha	....do	Arabia and Eastern Africa.	Varies according to commercial grade and source. By age becomes dry and inferior, losing volatile oil. Impurities of an extraneous nature—sand, bark, stone.	Undue quantities of extraneous impurity. Gum arabic, cherry gum, a brown gum called "gummi brasiliense," bdellium, used as adulterants.	Fair.
146	Ol. amygd. amar	....do	Europe	By age deposits benzoic acid, and becomes inferior.	Nitrobenzol, alcohol, chloroform; other volatile oils.	Fair.
147	Ol. amygd. express	....do	....do	Liable to become rancid....,	Cheaper fixed oils as adulterants and substitutes.	Good.

148	Ol. anisi	do	do		True anise oil substituted by the oil of star anise. Both adulterated with alcohol, camphor, wax, spermaceti, stearoptene of Russian fennel oil.	The oil of star anise generally used. No difficulty to obtain either oil of good quality.
149	Ol. bergami	do	Southern Italy	Slowly acquires a terebinthinate odor.	Oil of turpentine, oil of orange, alcohol, used as adulterants.	Fair.
150	Oleum cajaputi	do	India	Liable to change by exposure	Oil of turpentine and other volatile oils.	Good.
151	Ol. carui	do	Europe	Very liable to change by oxidation, acquiring an unpleasant terebinthinate odor.	An inferior oil, obtained from the chaff of the fruit is mixed with or entirely substituted for the true oil. Oil of turpentine.	Very indifferent in the general market, though good, pure oil is readily obtained in the larger markets.
152	Ol. caryophyll	Both	United States and Europe.	Darkens by age and exposure	Chloroform, castor oil, alcohol, carbolic acid.	Good.
153	Ol. cinnamom (ol. cassiæ).	Imported	True cinnamon oil from Ceylon; cassia oil from China and East India.	Slowly deteriorates by age. Resinifies.	Both the true cinnamon and the cassia oil adulterated with cheaper volatile oils, fixed oils, alcohol, and chloroform.	Very little true cinnamon oil is used, cassia oil being in general demand and readily obtained of good quality.
154	Oleum copaibæ	Both	United States and Europe.	Thickens and deteriorates by age and exposure.	Oil of turpentine, alcohol, copaiba.	Good.
155	Ol. coriandri	Imported	Mainly if not exclusively in Europe.	Very prone to change by age and exposure.	Oil of orange; oil of turpentine	Variable.
156	Ol. fœniculi	do	Europe	Very prone to change, acquiring a terebinthinate odor.	Cheaper volatile oils	Variable, on account of readily changing.
157	Ol. gaultheræ	Domestic	United States		Mixtures of alcohol and chloroform. Oil of sassafras-bark—introduced by distilling wintergreen and sassafras-bark together.	Good.
158	Ol. juniperi (berries)	Imported	Europe	Very soon acquires a terebinthinate odor.	Oil of juniper wood; oil of turpentine; alcohol.	Indifferent.
159	Ol. lavendulæ	do	do	Very prone to change on exposure.	Frequently adulterated with oil of turpentine. The oil of the entire plant sold for that of the flowering tops.	Very often inferior in the market. Sold by grades.
160	Ol. limonis	do	Southern France and Italy.	Very liable to acquire a terebinthinate odor on exposure.	Other oils of the citrus family, alcohol, oil of turpentine, petroleum oils.	Variable, probably on account of ready change.
161	Ol. menth. piper	Both	United States, England, and other parts of Europe.	Readily oxidized by exposure. Varies very much according to care taken in cultivating and collecting herb.	The oils of erigeron, pennyroyal, turpentine, eucalyptus, and sassafras; alcohol, castor oil.	Good to variable.
162	Ol. morrhuæ	do	United States; Norway.	By exposure acquires a very unpleasant odor, and becomes thick. According to care in preparation also it has more or less color and odor.	Cheaper fish oils. Rape and other vegetable oils, resin, &c.	Good.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
				Common ginger: African ginger, 200 pounds; capsicum hulls, 25 pounds; biscuit, 100 pounds; curcuma, to color. *Powdered ipecac:* Ipecac, 100 pounds; ship-biscuit, 25 to 40 pounds. *Powdered opium:* Turkey opium, 50 pounds; Egyptian opium, 25 pounds; biscuit, 40 pounds. *Powdered gamboge:* Gamboge, 100 pounds; tartrate of lime, 25 pounds. *Cream of tartar:* Mixed with 10 to 65 per cent. terra alba or tartrate of lime, and about 3 per cent. of tartaric acid. *Tartaric acid:* Mixed with 10 to 35 per cent. of alum. *Powdered Aleppo scammony:* Virgin scammony, 30 pounds; cocoa beans, 80 pounds; biscuit, 30 pounds; lamp-black, to color. *Powdered bird pepper:* Chilies, 1,000 pounds; rice, 800 pounds; curcuma and Venetian red, to color. *Powdered fenugreek:* Fenugreek-seeds, 1,000 pounds; biscuit ,1,000 pounds; curcuma, to color. *Powdered East India rhubarb:* East India rhubarb, 100 pounds; English rhubarb, 60 pounds. *Powdered English rhubarb:* English rhubarb, 100 pounds; biscuit, 30 pounds; curcuma, to color. *Powdered Turkey rhubarb:* East India rhubarb, Turkey rhubarb, equal parts.		
183	Pyrethrum	Imported	Algeria	Very liable to the attack of insects.	The root of other species of *Anacyclus* substituted. (In Germany the root of *A. officinarum* is officinal.)	Good.
184	Quinia salts	Both	United States, and Europe.	Liable to contain small proportions of the corresponding salts of the other cinchona alkaloids, particularly quinidia and cinchonidia.	Inorganic saline compounds, such as sulphate of sodium, magnesium, &c.; salicin, mannite, &c., have been used as adulterants. Cheaper alkaloids of cinchona substituted.	No difficulty to obtain pure salts of quinia.
185	Resina, jalapa, and scammony.	Domestic	United States		Adulterated with cheapar resins.	Good.
186	Rheum	Imported	China	Varies according to selection. Liable to attack of insects.	Inferior rhubarb rendered sightly by turmeric, or fine powdered rhubarb. Powder often made of inferior rhubarb, and rendered bright by turmeric.	Good. Select Chinese rhubarb is easily obtained at advanced prices.
187	Sago	do	East India	Fine powdery sago starch and dirt.	Much factitious sago is found in commerce, made from potato starch.	Variable.

188	Salep	do	Southern and Central Europe.		The tubers of *Colchicum autumnale* have been substituted. The powder adulterated with starch.	Good.
189	Santonin	do	Europe	Liable to change to photosantonic acid, becoming yellow.	Boracic acid to the amount of 50 per cent. Gum arabic in leaflets. Salicin.	Good.
190	Sapo (Castile)	do	France; Italy		Inferior vegetable and animal oils used in its manufacture. Large amount of water introduced. Heavy mineral matters, principally baryta, to increase weight.	Good soap, though often containing much water, readily obtained. Quality regulated by price, much inferior being in the market.
191	Sarsaparilla	do	South America and Mexico.	Varies according to source, care in collection, &c.	Inferior grades sold for the better. Substituted by the roots of *Arabia nudicaulis*, *Hemidesmus Indicus*, *Carex Arenaria*, and the climbing stems and roots of other plants.	Fair.
192	Scammonium	do	Levant		Chalk, flour, ashes, earthy matter, tragacanth introduced by collectors; also wax, yolk of egg, powdered scammony roots, resin, black lead. Occasionally entirely factitious.	Very variable.
193	Senega	Domestic	United States	Extraneous portions of the plant.	Ginseng, cypripedium, and other roots are now and then found in admixture, but are believed to be accidental.	Good.
194	Senna	Imported	Africa and Asia	Alexandria senna is very variable; often broken up and mixed with dust, leaf-stalks, fragments of branches, &c. Argel leaves always present.	Besides the impurities always found in Alexandria senna, all varieties of senna are liable to be admixed with the leaflets of other cassias and other leguminous plants.	Variable.
195	Serpentaria	Domestic	United States	Portions of stem, and occasionally the leaves attached.	The root of *Aristolochia reticulata* has been substituted under the name of Texan or Red River snake root. Hydrastis and spigelia have been used as adulterants.	Good.
196	Simaruba	Imported	South America		The bark of other simaruba barks has been substituted.	Good.
197	Sinapis	Both	United States and Europe.	Liable to deteriorate by exposure.	The seeds adulterated with those of other species of *Brassica*. The powder with farinaceous substances, pepper, capsicum, turmeric, gypsum, clay, &c.	As regards powder, very variable.
198	Sodii bicarbonas	Both	United States and Great Britain.	Liable to be deficient in carbonic acid (to be alkaline) and to contain sulphates and other impurities, from crude material use.		Good.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

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				Impurities and deteriorations.	Adulterations and substitutions.	
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183	Pyrethrum	Imported	Algeria	Very liable to the attack of insects.	The root of other species of *Anacyclus* substituted. (In Germany the root of *A. officinarum* is officinal.)	Good.
184	Quinia salts	Both	United States, and Europe.	Liable to contain small proportions of the corresponding salts of the other cinchona alkaloids, particularly quinidia and cinchonidia.	Inorganic saline compounds, such as sulphate of sodium, magnesium, &c.; salicin, mannite, &c., have been used as adulterants. Cheaper alkaloids of cinchona substituted.	No difficulty to obtain pure salts of quinia.
185	Resina, jalapa, and scammony.	Domestic	United States	....	Adulterated with cheaper resins.	Good.
186	Rheum	Imported	China	Varies according to selection. Liable to attack of insects.	Inferior rhubarb rendered sightly by turmeric, or fine powdered rhubarb. Powder often made of inferior rhubarb, and rendered bright by turmeric.	Good. Select Chinese rhubarb is easily obtained at advanced prices.
187	Sago	....do	East India	Fine powdery sago starch and dirt.	Much factitious sago is found in commerce, made from potato starch.	Variable.

188	Salep	do	Southern and Central Europe.		The tubers of *Colchicum autumnale* have been substituted. The powder adulterated with starch.	Good
189	Santonin	do	Europe	Liable to change to photosantonic acid, becoming yellow.	Boracic acid to the amount of 50 per cent. Gum arabic in leaflets. Salicin.	Good.
190	Sapo (Castile)	do	France, Italy		Inferior vegetable and animal oils used in its manufacture. Large amount of water introduced. Heavy mineral matters, principally baryta, to increase weight.	Good soap, though often containing much water, readily obtained. Quality regulated by price, much inferior being in the market.
191	Sarsaparilla	do	South America and Mexico.	Varies according to source, care in collection, &c.	Inferior grades sold for the better. Substituted by the roots of *Arabia nudicaulis*, *Hemidesmus Indicus*, *Carex Arenaria*, and the climbing stems and roots of other plants.	Fair.
192	Scammonium	do	Levant		Chalk, flour, ashes, earthy matter, tragacanth introduced by collectors; also wax, yolk of egg, powdered scammony roots, resin, black lead. Occasionally entirely factitious.	Very variable.
193	Senega	Domestic	United States	Extraneous portions of the plant.	Ginseng, cypripedium, and other roots are now and then found in admixture, but are believed to be accidental.	Good.
194	Senna	Imported	Africa and Asia	Alexandria senna is very variable; often broken up and mixed with dust, leaf-stalks, fragments of branches, &c. Argel leaves always present.	Besides the impurities always found in Alexandria senna, all varieties of senna are liable to be admixed with the leaflets of other cassias and other leguminous plants.	Variable.
195	Serpentaria	Domestic	United States	Portions of stem, and occasionally the leaves attached.	The root of *Aristolochia reticulata* has been substituted under the name of Texan or Red River snake root. Hydrastis and spigelia have been used as adulterants.	Good.
196	Simaruba	Imported	South America		The bark of other simaruba barks has been substituted.	Good.
197	Sinapis	Both	United States and Europe.	Liable to deteriorate by exposure.	The seeds adulterated with those of other species of *Brassica*. The powder with farinaceous substances, pepper, capsicum, turmeric, gypsum, clay, &c.	As regards powder, very variable.
198	Sodii bicarbonas	Both	United States and Great Britain.	Liable to be deficient in carbonic acid (to be alkaline) and to contain sulphates and other impurities, from crude material use.		Good.

TABLE II.—*Showing the causes of inferiorities in drugs and chemicals, &c.*—Continued.

No.	Drug.	Imported or domestic.	Where produced.	Causes of inferiority.		Commercial quality.
				Impurities and deteriorations.	Adulterations and substitutions.	
199	Sodii et potass. tartras	....do	United States and Europe.	Impurities resulting from carelessness in manufacture.	Sulphate of sodium and similar compounds.	Good.
200	Spigelia	Domestic	United States	Extraneous portions of the plant and dirt.	The roots of *Phlox carolina* have been substituted. Serpentaria, probably as accidental admixture.	Fair.
201	Spiritus ætheris comp.	....do	......do	Liable to become acid by age and exposure.	Substituted by a spirit often deficient both in alcohol and ether and containing no heavy oil of wine. A preparation containing light oil of wine (!), but otherwise corresponding in strength to the officinal commonly sold.	Very few manufacturers even pretend to furnish the officinal preparation.
202	Spiritus ætheris nitrosi.	....do	......do	Liable to acquire strongly acid properties, owing to ready change of nitrous ether and aldehyde contained in the preparation.	Often deficient in ether as well as alcohol.	Very indifferent.
203	Styrax	Imported	Asia Minor	Liable to lose volatile components by exposure. Contains extraneous impurities.	Sand, ashes, and other substances mixed with it; turpentine.	Fair.
204	Sulphur, precipitate.	Both	United States and Europe.	When insufficiently washed and dried liable to become acid.	Gypsum in large proportion by following a peculiar method of manufacture. Flour, starch, &c., have been noticed.	Good.
205	Tapioca	Imported	South America	....	Factitious tapioca made with other starches.	Commercial tapioca often factitious.
206	Taraxacum	Both	Europe and United States.	Varies according to season of collection. Liable to attack of insects, particularly when not properly dried.	Chicory roots and the roots of *Leontodon hispidus* substituted.	Fair.
207	Terebinthina Canadensis.	Imported	Canada	Liable to lose volatile oil and to become thick or solid on exposure.	Substituted by the oleoresins of other coniferous trees. "Oregon balsam," a factitious article, substituted.	Good.
208	Uva ursi	Domestic	United States	Stems and other extraneous matter.	The leaves of *Vaccinium vitisidæa*, *V. saliginosum*, *Leiophyllum buxifolium*, and *Buxus sempervirens* have been used as adulterants.	Fair to good.

209	Valeriana	Both	New England and Europe.	Varies according to locality and care of collection and preservation. Frequently dirty.	Substituted by the roots of other species of *Valeriana*; also *Asclepias vincetoxicum* and species of *Nardus*.	Fair
210	Wintera	Imported ...	South America	....	The barks of *Canella alba* and *Cinnamodendron corticorum* have been substituted for Winter's bark.	
211	Xanthoxylum.........	Domestic ...	United States...........	Liable to lose strength and to deteriorate by exposure.	The bark of *Aralia spinosa* has been substituted for prickly-ash bark.	Good.
212	Zingiber..............	Imported ...	West Indies, India, and Africa.	Liable to injury by age and exposure, and differs accordingly.	Inferior ginger is artificially whitened. Powder liable to the adulterations common to all spices.	Good grades are readily obtained in the market; but much of indifferent quality is to be met with.

THE KNOWN AND PROBABLE EFFECTS OF THE USE OF INFERIOR AND ADULTERATED MEDICINES UPON PUBLIC HEALTH.

It having been shown in the preceeding chapters how inferiorities in drugs and medicines may be produced, and what is the character of such inferiorities; it having, moreover, been shown that such inferiorities are as much dependent upon accident as upon design, and that for this reason they must always exist to a greater or less extent, it becomes a proper inquiry: "What is the effect of inferior drugs and medicines upon public health?"

One need not be a physician to appreciate the fact that satisfactory medication is impossible when the medicine administered is not that designed by the prescriber. It is not sufficient that the medicine should "very nearly" be that which is designed; it should "absolutely" correspond to the standard which the physician has before his mind at the time when he finds it necessary to prescribe it. It is therefore the duty of the dispenser to see to it that the medicines he dispenses conform in every respect to the standard that has been framed for his guidance as well as for the guidance of the physician. The fulfillment of these conditions depends not alone on the integrity of the dispenser, it depends equally on his knowledge and skill; and unless these are combined with integrity, the prescriber cannot hope for results which the nature of the disease may justify him to expect. Finding that the medicine has not the expected effect, the prescriber may be led to increase the dose, or to replace that originally prescribed by another, without, however, ameliorating the disease or causing it to yield to his treatment. He now, perchance, begins to suspect that the medicine supplied is not as it should be, and, changing his apothecary, soon cures his patient. If all cases of bad medication were as simple in their development as the one illustrated, there would perhaps be no necessity for this report. Unfortunately, however, such is not the case. It quite often happens that, the diagnosis being well established, it is urgent that the proper medicine should be promptly administered. If in a case of this nature the medicine should happen to be of indifferent or inferior quality, the life of the patient is placed in jeopardy, and under circumstances sacrificed. Again, the prescriber, conforming the medication to his diagnosis, may be led to reject that originally made, because he fails to obtain the effect which an abundant experience justifies him to expect from the drug administered. In a case of this kind, he may for a time be completely at fault, while the illness of his patient is vexatiously prolonged or it may be aggravated. In short, the use of inferior and adulterated medicines may be the cause of protracted disease, of increased suffering, and in some instances of death; and failing to mitigate and cure diseases in which the pure medicine is unequivocally indicated, they may lead the physician to errors in diagnosis, cause him to acquire the habit of prescribing large doses of active medicines, and in fact seriously affect his success and reputation.

Finally, there are many medicines that are in daily demand over the counter of the druggist as household remedies, with or without the sanction of the physician. Many of these are of an innocent nature, and being used for trifling ailments, any variation in their strength is not attended with serious consequences. Others, however, are quite active agents, or contain such. This is particularly the case with preparations containing opium, for all of which commonly dispensed there exist either officinal or other authoritative formulas. It is plainly the duty of the dispenser to adhere to such authoritative formulas, whether officinal or not; but from motives of gain and competition the preparations of some shops contain variable quantities of opium, often one-half or less of that which is proper, and this is true equally of the more powerful ones and of the weaker preparations intended for the infant. Naturally the dose of such a weak preparation is increased until the desired effect is obtained, and all works well until the supply is replenished by some conscientious dealer, when, as is unavoidable, an overdose is the result, attended with more or less serious consequences.

In the foregoing chapters the writer has pointed out the conditions of inferiority in drugs and medicines, how these conditions are created, and what some of their influences may be upon public health. It naturally follows that we should also inquire into

THE MODES WHEREBY THESE CONDITIONS MAY BE PREVENTED OR MODIFIED.

Inferiorities in drugs and medicines being brought about both by accident and design, it must be evident that measures of prevention or amelioration that will reach one kind of causes of inferiority need not necessarily reach the other. To reach the one, wise legislative enactments appear to be called for, while the other can only be reached through the medium of education. Let us consider:

1. *What may be accomplished by legislative enactments.*—When speaking of the influences that have shaped the present condition of the drug market, it was shown that however imperfect the drug law might be, its influence for the better was soon felt, and that it has continued to the present day to exercise a wholesome effect in pre-

venting the introduction of inferior or adulterated drugs and medicines from abroad. On the other hand, it was contended that the law itself was far from perfect; that owing to the system of political appointment, it was at times very imperfectly administered: and that at the present day inferior and falsified goods are occasionally admitted from abroad. Now, if we admit this to be a truthful statement of facts, it must become plain that if we remove the existing imperfections in the law, if we uniformly secure the services of officers of high integrity and qualifications, and if we furnish these officers with ample means and authority to carry out the law, it is quite possible to secure the complete exclusion of inferior drugs and medicines from abroad, and thus to remove one fruitful source of bad medicines. What some of the faults of the present law are has already been pointed out, and others might be mentioned; but their further discussion would extend this report beyond proper limits, since it is not so much a question of what are the faults of the present law as of what a drug law should be to secure the introduction of pure drugs from abroad to the exclusion of all inferior qualities. The writer has given this subject much thought, and having carefully followed the discussions that have from time to time been called forth since the passage of the law, submits the following conditions as being, in his opinion, best calculated to secure the certain and uniform rejection of inferior drugs and medicines that may be presented for entry from abroad:

A distinct service, or bureau, for the supervision of drugs presented for entry from abroad should be established, with a central office at Washington and subordinate offices at the different ports of entry.

The chief of this bureau, who may have the title of "chief inspector" of drugs, should be directly responsible to the Secretary of the Treasury. His immediate staff should be composed exclusively of experts, who, according to their grade, may have the title of "inspector" or "assistant inspector" of drugs.

The various ports of entry should be rated according to their importance, and the subordinate offices thus created provided with inspectors or assistant inspectors, or both, if necessary. At smaller ports of entry an assistant inspector might be stationed, who should be immediately responsible to the inspector at one of the large ports.

It should be the duty of such assistant inspector to inspect all drugs presented at his port for entry, and to send a sample of the same, accompanied with his opinion of quality, to the inspection office to which he is affiliated for examination or final decision. At the larger ports an inspector, with one or more assistant inspectors if necessary, should be stationed. It should be the duty of the inspector of drugs to examine all drugs, by analysis or otherwise, that may be presented at his port or at the ports affiliated to his office for entry. In the event of the rejection of any drug or medicine, a sample of such should be sent to the office of the chief inspector for further control, such sample to be eventually either preserved as a cabinet specimen, or, after the lapse of a certain period allowed to the importer for appeal from the decision of the inspector, to be destroyed.

It should be the duty of the chief inspector of drugs to exercise a general supervision of the service, to establish proper and fair standards for the guidance of inspectors, and in the event of an appeal by the importer from the decision of inspectors, to give the final decision, based upon a careful examination of the rejected article at his office.

All of these officers should be provided with abundant facilities for the prompt and efficient execution of their duties, such as ample room for office and laboratory, chemical apparatus, re-agents, and books. Each station should also be provided with a cabinet of specimens, exemplifying standard as well as adulterated and inferior conditions of drugs and medicines.

Assistant inspectors at the smaller ports should report annually to the inspector to whom they may be assigned. Inspectors should report annually to the chief inspector, and be annually to the Secretary of the Treasury. Such reports should embrace, among other things, the quantity and general character of the drugs and medicines that have been admitted, as well as the quantity and the character of inferiority of such as have been rejected.

Appointments to each and all of these offices should never be made by political preferment, but solely on the ground of qualification and fitness; and the tenure of office should depend altogether on the ability and integrity of the officer. And to secure such officers it will become necessary to pay good salaries.

There must necessarily be a wide difference of opinion with respect to the manner of the appointment of the officers required for this service, but the following plan is submitted as one that is calculated to remove such appointments completely from political control, as they should be:

Let the Secretary of the Treasury appoint one inspector for each of the principal ports of entry, including Washington, from among a specified number of names presented for this purpose by a commission of five experts; such commission to be created as follows: One member shall be selected by the Secretary of the Treasury, one by the National Board of Trade, one by the National Board of Health, one by the American

Pharmaceutical Association, and one by the Association of Wholesale Druggists (other representative association of the wholesale drug trade).

Let the inspectors so appointed select from among their number a chief inspecto Let them also, from among their number, select a suitable committee for the examination of applicants for the positions of assistant inspector, and let, in this manne this grade of officers be appointed solely on the basis of their peculiar fitness for the office. Such a committee should also be selected annually for the examination of applicants to fill vacancies or to supply additional assistants. Let vacancies occurring in the offices of inspector be filled from among the assistant inspectors, eithe by seniority or by making such appointment dependent upon competitive examination Finally, let removals from any and all of the offices be made only on conviction fo incompetency or malfeasance.

But even supposing that the drug law is made so efficient and is executed with suc care that inferior drugs are completely excluded from entry, it cannot reach the inferiorities that are produced at home. In European countries, particularly in th German Empire, where the practice of pharmacy is restricted by protective grant and concessions, there is less necessity for a drug law guarding importations, becaus the government, by periodical inspections of the pharmacies,* reaches inferiorities an abuses of every description. Under our republican form of government, however such a system cannot be introduced in this country. Congress has no power to pass general law bearing upon this subject, that shall have equal application in all th States. Neither is it desirable that any law should be created that interferes in any degree with the principles of free trade; or that a system of censorship should be applied to a class of dealers, for whose conduct there exists no clearly defined or prescribed standard. We must therefore in this country look for different measures from those applied under monarchical governments for the same object; and such measures must necessarily be enacted by the legislatures of the States to which they are to apply, and will be effective throughout the United States only if uniform action can be had in this direction in every State.

How far such enactments may go without becoming oppressive in their character or unduly restrictionary to the free development of pharmacy, the writer is not prepared to say; but that it is perfectly proper and desirable to restrict and prevent the sale of impure or adulterated drugs by framing appropriate laws and putting them in force cannot be gainsaid; for such enactments, though generally very imperfect, are and have been on the statutes of many States for years. Unfortunately many of these laws are very obscure, both in their wording and intent; none of them make suitable provision for their enforcement, reliance being evidently placed upon the accidental discovery of an adulteration of food or medicine, and then the equally accidental prosecution. How such a law should be framed and how it should be enforced in order to make it effective has been subject of discussion by able pharmacists, physicians, and sanitarians at various times and in various places, and of course opinions have widely differed. Perhaps no single individual, however, has had more abundant opportunities to observe the various characters and conditions of inferiority in drugs than Dr. Edward R. Squibb, of Brooklyn, and certainly no individual on this side of the Atlantic has given the subject of adulterations more attention than he. Any proposition for measures to prevent such conditions, therefore, coming from him, deserves careful attention and consideration and should be calculated to ameliorate if not to prevent them. Attention is therefore directed to the "rough draft of a proposed law to prevent the adulteration of food and medicine and to create a State board of health," which was read by Dr. Squibb before the Medical Society of the State of New York, and which is appended to this report. If such a law, or, if necessary, a more suitable modification of it, were enacted by the general government for the District of Columbia, it might serve as a type for similar enactments in the different States, and thus uniformity of action throughout the United States might be secured. This, also, is the extent to which legislation may *directly* prevent or ameliorate conditions of inferiority in drugs and medicines. That it can also be *indirectly* instrumental in ameliorating these conditions will be further shown in the following:

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*Dr. Fred Hoffmann, in his very interesting paper on "Pharmacy in Prussia and the German Empire" (Amer. Jour. Pharm., 1871, 337 and 389), describes this system of inspection as follows:

"The only direct control which the government exercises over the pharmacies and pharmaceutists consists in the inspection of the pharmacies, which is compulsory every three years, but which may be performed oftener if judged necessary, or if called for by the apothecary or by the district or municipal authorities. This inspection is no dead letter, but is a severe, searching operation, performed by a delegation nominated by the provincial government, and consisting of the presiding councillor of the provincial government (Regierungs-Medicinalrath), the district physicus, the district and some other delegated apothecary. One or more representatives of the local municipal authorities are always invited to attend the inspection. Not only are the drugs and the entire stock examined, but also the assistants and apprentices. The inspectors examine the apothecary's diploma, license, pharmacopœia, library, herbarium, prescription books, and the prices charged for the prescriptions therein. Assistants and apprentices are required to show their examination certificates, are asked questions on the pharmaceutical sciences, on the pharmacopœia, and have to submit to an inquiry into their studies, diligence, and progress. Most drugs, especially those liable to sophistication, and all pharmaceutical and chemical preparations are examined and tested. Store, laboratory, store-rooms, and cellar are inspected minutely. A résumé of the entire inspection is made and signed by all delegates and witnesses, and is sent to and kept by the provincial government. From this the apothecary receives a report of the result of the inspection, with either acknowledging reflections, counsels for his or his assistants' benefit, or polite but precise and firm reprimands.

"The intercourse of the civil and judicial authorities with all citizens being dignified and polite, though strict, and without regard to position, means, or rank, the relations of the authorities to the apothecaries is likewise characterized by consideration and respect. Like all other professions, there is a great deal required from the apothecary; a high status of professional competency, fidelity, and uncompromising reliability. In return, the State grants protection, and in ordinary life he enjoys the confidence and esteem of the public, by virtue of his vocation."

2. WHAT MAY BE ACCOMPLISHED BY EDUCATIONAL INFLUENCES.

If we may be allowed to judge by past experiences, we cannot look forward to early enactments of laws that shall effectually modify or prevent adulterations or other inferiorities in medicine. At best this process will be very gradual, and the public would therefore fare ill if other and powerful influences had not been brought and did not continue to bear in this direction.

It has been elsewhere pointed out how the American Pharmaceutical Association exerted a powerful influence in shaping the present favorable condition of the drug market. It has accomplished this solely by its untiring efforts to impart and disseminate knowledge, and by its tendency to elevate the professional character and standing of pharmacists. When that association was first organized, there existed only a few colleges of pharmacy and only a single local association outside of these colleges. At the present day there are some twelve or more colleges of pharmacy, where young pharmacists may acquire the theoretical training so necessary to their profession. State pharmaceutical associations have also been organized in many of the States of our Union, while in most of the largest cities associations of the alumni of the colleges of pharmacy have been formed. Most of these institutions and associations owe their origin indirectly to the American Pharmaceutical Association, and their beneficent influences upon the condition of pharmacy in this country cannot be overestimated, inasmuch as it is believed that to moral and educational rather than to legislative and compulsory modes we must largely look for the amelioration of conditions of inferiority brought about in dispensing establishments.

It does not follow, however, that on this account legislative measures should be neglected. To the contrary, the influence of law may be properly brought to bear so as to compel dispensers of medicine to acquire the knowledge that is necessary to the safety of the public. To this end much has already been done, but much more is required; and it is proper to state that in this direction also the pharmacists themselves, again through the medium of the American Pharmaceutical Association, have taken the initiative, by urging upon the legislatures of the different States the necessity of restricting the compounding and dispensing of medicines upon the prescription of physicians to persons who have suitably qualified themselves for their responsible vocation. In 1869 the draft of such a law (see appendix) was submitted to the governors, presiding officers of legislatures, and leading judges of all the States, with a view to drawing attention to the necessity of a law as well as to secure uniformity of action throughout the United States. Previous to that time laws on pharmacy existed only in two States—in Georgia and in Alabama—but these were long allowed to be dead letters. Since then laws have been enacted in many States,[*] all of which conform in some degree to that drafted by the American Pharmaceutical Association, but are more or less imperfect, either by being restricted in their application to cities having a certain number of inhabitants or by other deviations from the original draft, found necessary, unfortunately, to secure their passage.

Educational influences should not alone be brought to bear upon the pharmacist; they must also be brought to bear upon the general public; not that it is at all necessary that the public should have an intimate knowledge of remedial agents—though there is no objection provided such knowledge is positive, and not, as is too frequently the case, empirical—but the public should be led to recognize that the business of the pharmacist is largely professional in its character; that he constantly sacrifices both time and money's worth in order to keep his stock of medicines in a suitable condition for successful medication; that he must keep in stock a large variety of medicines—often very expensive, but seldom demanded or readily deteriorating—so that he may promptly and at all times meet the demands of prescribers; that he is obliged to be in readiness at all hours, day or night, to respond to such demands; that his returns are rarely commensurate with the sacrifices of time as well as of comfort that he is obliged to make, and that therefore his charges cannot be regulated by the rules that ordinarily govern trade.

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[*] Pharmacy laws are now in force in the following States: Rhode Island (1870 and 1871), applying to the whole State; Maryland (1870 and 1872), applying to the city of Baltimore; New York (1871 and 1872), applying to the city of New York; Pennsylvania (1872), applying to the city of Philadelphia; California (1872), applying to San Francisco County; Ohio (1873), applying to cities of 175,000 inhabitants; Missouri (1874), applying to the city of Saint Louis; Kentucky (1874), applying to towns and cities of 5,000 or more inhabitants; New Hampshire (1875), applying to the whole State; South Carolina (1876), applying to the whole State; Maine (1877), applying to the whole State, and New Jersey (1877), applying to the whole State. For the District of Columbia, also, a law was passed by Congress within the past few years.

Finally, the relation of the medical profession to that of pharmacy in this country is not as satisfactory as it should be, and must to a certain extent be held responsible for the unsatisfactory conditions under discussion. The pharmacist occupies a very peculiar position. Being both a tradesman and a professionalist, he unites in his dual calling opposing interests. As a tradesman, it is his sole aim to make money; as a professionalist, it is his aim to guard the interests of the public by supplying medicines of pure quality, without regard to cost or trouble. If he succeeds in uniting these diverging interests, then both the public and the pharmacist are the gainer; but if he fails in this, the one or the other must necessarily suffer. The physician is purely a professionalist. It is his aim, if he deserves that title, to ameliorate and cure disease without regard to the material recompense that may follow, and to this end it is his duty to draw into requisition the best agents that knowledge and science may point out to him. But does the physician always do this? Is he careful to inform himself, so that he may be able to judge the quality of the medicine that may be furnished on his prescription? Is he not in duty bound to prescribe only such medicines the characters of which are or may be well established? Is he justified in prescribing "special" remedies, the exact composition of which is wholly or in part withheld? Is it not his duty so to formulate his prescriptions that it is possible for any practical pharmacist to compound the same from among the recognized drugs, chemicals, and preparations that may be found in all well-regulated pharmacies? Is it not also his duty to encourage the pharmacist to prepare all medicines, the characters of which are such as to make it difficult to establish variation from the standard that may exist, and however slight such may be? Does he not, by the pernicious practice of prescribing the preparations of specified manufacturers, which practice has increased to such an extent as to be an abuse, bring about the very conditions that are so largely instrumental in introducing inferior medicines, by causing the dispenser of medicines to overstock his shop with preparations that are liable to deterioration; by restricting his field of observation in the preparation of medicines; by tempting him to substitute the preparation of one manufacturer, which is in stock, for that of another which it is difficult or unprofitable to procure; by making him indifferent to the professional duties of his calling, when those of the tradesman are so constantly in requisition, and his skill and knowledge count for nothing?

This report would be incomplete if a short chapter were not devoted to so-called

PATENT MEDICINES.

Statisticians, as well as other competent authorities, have shown that more secret remedies, so-called "patent medicines," are prepared, sold, and consumed in the United States than in any other country. The trade lists of these preparations embrace a much larger number of articles than the list of medicines embraced by our pharmacopoia, and their consumption is at least equal to, if not, as is contended by some, larger than that of legitimate medicines. It is useless to argue with the public that the pernicious effects of this class of medicines far outweigh their good effects; that cures are very rarely effected by their use, and that such are purely accidental; that their popular estimation is based altogether on temporary or imaginary relief; and that, being on this account recommended and resorted to in every emergency, they are far more likely to do much mischief than to do a little good. It is difficult for the public to understand that the manifestations of pain or discomfort observed in illness are only symptoms of the disease, and that such symptoms, though to the uninitiated apparently identical, may point to entirely distinct diseases; and that, therefore, the remedy that is indicated for the one may be entirely unsuited, or, as is often true, hurtful in the other. The public, furthermore, fail to appreciate the fact that in this class of medicines often lurks a far greater evil than that which they are expected to cure or alleviate. The most energetic agents of the materia medica are known to enter into their composition often in quantities that a physician would hesitate to prescribe; such being necessary to produce the decided and prompt manifestation of effect upon which their sale and popularity so largely depends. Narcotics or stimulants are largely represented in them, and it is easy to understand, not only how in a large class of diseases, real or imaginary, temporary relief may be obtained, but also how such may be the direct cause of habits, the ultimate consequences of which are moral and mental ruin and death.

The subject of "patent medicines," in its bearings upon public health, has so frequently been discussed by writers of note, in both the medical and pharmaceutical journals, that very little further light can be thrown upon the subject now. That their indiscriminate sale and consumption has brought about many and serious evils, and that therefore it is necessary to bring into force some controlling influence whereby these evils may be modified and ameliorated, is admitted by all who have given their attention to this subject. It is by no means clear, however, how this desirable sanitary measure may be accomplished. Among the different plans that have been proposed, a modification of that requiring the publication of the formulas of "patent medicines" upon the label strikes the writer as best calculated to modify the evil effects resulting from their use. Indeed, a United States law bearing upon this subject is not only desirable, but necessary, if it is aimed to carry out effectually the following article* pertaining to the existing drug law:

"Patent and secret medicines are by law subject to the same examination as other medicinal preparations, and cannot be permitted to pass the custom-house for consumption, but must be rejected and condemned unless the special examiner be satisfied after due investigation that they are fit and safe to be used for medicinal purposes."

How is the special examiner, however, to determine the fitness and safety for medicinal use of such a preparation unless he has some standard to guide him? It is true, he can by analysis determine the presence of active medicinal agents, quantitatively as well as qualitatively; but the presence of such, whether in large or small proportion, need not necessarily debar it from entry. If, on the other hand, the quality as well as the quantity of active medicinal agents allowable in such medicines were plainly defined, a standard would be established whereby special examiners might regulate their action.

To reach this class of "patent medicines," as well as those that are prepared in this country, both a United States and State laws are probably necessary. However that may be, a law to be effectual must be general in its application, and, if such can be had, the following modification of the plan requiring the publication of the formula upon the label is perhaps the most just, both to the manufacturer and the consumer:

1. Designate by law what substances shall be regarded as "active" medicinal agents.
2. Designate the extreme quantity of such active medicinal agents that may be contained in a given quantity of a "patent medicine," both with reference to its being the sole active component and to its being combined with other active agents possessing similar physiological action.
3. Require all "patent medicines," whether of foreign or domestic manufacture, to be registered by their full title at some suitable office under the control of the general government, requiring also that the uses to which such medicines are to be applied, and the doses in which they are recommended to be given, be placed on record.
4. In the event that such a "patent medicine" contains one or more medicinal agents classed as "active" within the meaning of the law, require the manufacturer to deposit at the registering office information of the exact quantities of such that are represented by a given quantity of the preparation.
5. Require under all circumstances that the minimum and maximum doses of the "patent medicines" be distinctly printed on the label; and if it contains one or more of the "active" medicinal agents designated as such by law, that their presence be unequivocally given upon the same label; not, however, requiring that their quantity or proportion be stated upon such.

A law of this character would enable governments, the medical profession, as well as the consumer, to form in some degree a judgment of the character and probable effect of a "patent medicine," and would greatly tend towards ameliorating and preventing the evil effects observed under existing conditions. And if, in addition to such a law, the public can be brought to place greater reliance upon legitimate medicine and less upon the professions of charlatans and mountebanks—if, moreover, a better relation between the public, the pharmacist, and the physician can be established—the use of "patent medicines" will ever be confined to the classes among which such will always find favor—the low and the ignorant.

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*Article 256 (Sec. X.) of the "General regulations under the revenue and collection laws of the United States," 1857, p. 158.

APPENDIX.

A.

m-houses since 1848, as communicated to the American Pharmaceutical Association at various periods.

	New York.			Baltimore.	Boston.	
.	1853.	1873.	1874.	1853-1856.	1848-1852.	1867.
ds..	246 pounds..					
ds..			1 bale.			
ds..						
		11 bales				
	860 pounds..					
ds..						
			1 case.			
ces..						
		1 bale				
			1 bale.			
		1 barrel.				
ds..						
		1 bale				
ds..		2 casks				
		1 bale				
ds..						
		5 bales				
ds..						
es..						
						3, 600 pounds.
		6 bales				
		1 bale.				
ds..						
					189 pounds.	
ds..						
ds..						
						300 pounds.
ds..	1, 130 pounds..	25 barrels	2 cases, 5 barrels			
ds..		1 bale				
				465 pounds.		
		7 bales.				
es..						
es..						
ds..			201 bales.			
ds..		1 case.				
ds..						

Licorice root	9, 430 pounds						
Magnesia, calcined	1, 560 pounds	875 pounds					
Magnesia, carbonate	2, 867 pounds	3, 900 pounds					
Manna		720 pounds					
Mezereon bark	1, 353 pounds		1 bale				
Myrrh		837 pounds					
Opium	3, 164 pounds	675 pounds	40 cases	33 cases		6, 396 pounds	400 pounds.
Pareira Brava root	730 pounds						
Peruvian bark	304, 185 pounds	38, 459 pounds		6 bales	38, 062 pounds	1, 200 pounds	
Poppy flowers	190 pounds						
Quinia sulph	3, 200 ounces						
Rhubarb root	5, 782 pounds	610 pounds	5 cases				
Rhubarb-root powder			1 case				
Roots and seeds					367 pounds		
Saffron	360 pounds						
Sarsaparilla root	65, 374 pounds	4, 870 pounds					400 pounds.
Savin leaves			1 bale				
Scammony	230 pounds	495 pounds		20 pounds		2, 095 pounds	1, 200 pounds.
Senna leaves	31, 838 pounds	11, 820 pounds	3 bales			271 pounds	
Serpyllum			1 bale				
Squills	1, 626 pounds	1, 537 pounds	24 bales				
Sugar of lead		11, 017 pounds					
Sulphur. precip		3, 620 pounds					
Valerian root	650 pounds					1, 839 pounds	
Viola herb			1 bale				
Volatile oils					1, 928 pounds		
Wormseed	230 pounds						

NOTE.—Inquiry made at the Bureau of Statistics developed the fact that while statistical record of admitted drugs is kept no note is taken of drugs that are rejected. The above fragmentary list is, therefore, probably the only record of drugs that have been rejected at the different custom-houses since the law went into effect.

APPENDIX.

A.

Fragmentary list of drugs rejected at the different custom-houses since 1848, as communicated to the American Pharmaceutical Association at various periods.

Drug.	New York.				Baltimore.	Boston.	
	1849-1852.	1853.	1873.	1874.	1853-1856.	1848-1852.	1867.
Aloes	12, 375 pounds	246 pounds					
Althæa root	1, 117 pounds			1 bale			
Assafœtida	3, 700 pounds						
Belladonna leaves			11 bales				
Benzoin		860 pounds					
Bistort root	140 pounds						
Blue pill				1 case			
Bromine	430 ounces						
Buchu leaves			1 bale				
Buckthorn bark				1 bale			
Calamus root			1 barrel				
Cantharides	1, 276 pounds						
Cardui Benedict			1 bale				
Chamomile flowers	1, 896 pounds		2 casks				
Colchicum root			1 bale				
Colchicum seed	2, 246 pounds						
Conium leaves			5 bales				
Cream of tartar	7, 673 pounds						
Creasote	140 ounces						
Cubeb *stalks*							3, 600 pounds.
Dandelion root			6 bales				
Elder flowers			1 bale				
Ergot	475 pounds						
Gambogo						189 pounds	
Gentian root	7, 572 pounds						
Gentian-root powder	430 pounds						
Gold thread							300 pounds.
Guaiacum resin	9, 300 pounds	1, 130 pounds	25 barrels	2 cases, 5 barrels			
Hellebore root	460 pounds		1 bale				
Herbs and flowers					465 pounds		
Hyoscyamus leaves			7 bales				
Iodide potassium	3, 720 ounces						
Iodine	6, 864 ounces						
Jalap root	37, 121 pounds			201 bales			
Kino	280 pounds		1 case				
Lavender flowers	3, 042 pounds						

Licorice root	9, 480 pounds						
Magnesia, calcined	1, 560 pounds	875 pounds					
Magnesia, carbonate	2, 867 pounds	3, 900 pounds					
Manna		720 pounds					
Mezereon bark	1, 353 pounds		1 bale				
Myrrh		837 pounds					
Opium	3, 164 pounds	675 pounds	40 cases	33 cases		6, 396 pounds	400 pounds.
Pareira Brava root	730 pounds						
Peruvian bark	304, 185 pounds	38, 450 pounds		6 bales	38, 062 pounds	1, 200 pounds	
Poppy flowers	190 pounds						
Quinia sulph	3, 200 ounces						
Rhubarb root	5, 782 pounds	610 pounds	5 cases				
Rhubarb-root powder			1 case				
Roots and seeds					367 pounds		
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Squills	1, 626 pounds	1, 537 pounds	24 bales				
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Volatile oils					1, 928 pounds		
Wormseed	230 pounds						

NOTE.—Inquiry made at the Bureau of Statistics developed the fact that while statistical record of admitted drugs is kept no note is taken of drugs that are rejected. The above fragmentary list is, therefore, probably the only record of drugs that have been rejected at the different custom-houses since the law went into effect.

ROUGH DRAFT OF A PROPOSED LAW TO PREVENT THE ADULTERATION OF FOOD AND MEDICINE AND TO CREATE A STATE BOARD OF HEALTH.

By E. R. SQUIBB, of Brooklyn.

To the Medical Society of the State of New York:

The subject of a law to prevent the adulteration of food and medicine has throughout the past year been under consideration by a joint committee made up of representatives from the New York Academy of Sciences, the New York Academy of Medicine, New York County Medical Society, the Therapeutical Society, New York College of Pharmacy, New York Medico-Legal Society, the Public Health Association, and the American Chemical Society, and considerable time has been devoted to the examination of the subject, and two or three drafts of laws besides this have been prepared and submitted to discussion.

After a review of some part of the experience of Great Britain under the "Sale of food and drugs act" of 1875, and a consideration of the chief difficulties it has encountered up to this time, the present writer believes that any law to be effective and of easy application must carefully avoid certain points of difficulty which have been brought out by the British law.

First. The law must so clearly define the offense of adulteration in all its various forms, even by repetition in wording the definition where this may be useful, as to make the various forms of the offense plain to the understanding of the persons who adulterate, rather than by general definitions to leave too much to be decided only by litigation in the courts. If the offense be well defined to the person who adulterates, the first effect will be to prevent or deter him. Failing in this, it will make the facts establishing the offense so clear as to economize the time of the courts and law officers, and leave to them to decide mainly upon the character, turpitude, and degree of the offense charged, and thus adjust and apply the penalty. Hence, in the draft of a law here presented, the defining clauses might be construed by the careful logic of a legally-trained mind as mainly repetitions of one idea. Yet, to the minds of the class of shrewd money-makers in the community to whom and to whose practices the definitions are really addressed, the looseness of a general phraseology would fail in deterring them from taking the chances of discovery and conviction. And, again, under this head and for these same reasons the standards for comparison by which the offense is to be determined should be a part of the law, and be much more definite than by the British law.

To illustrate the utility of careful and clear definitions of various known forms of the offense as aimed at by the different defining clauses, one or two typical instances of common adulterations are given in the margin of each defining clause to show its special application.

Secondly. The questions of intent to defraud and of injury or prejudice to the purchaser of adulterated articles, either as to health or to cost, are carefully avoided, because in a definite, fully recognized shape they are entirely wanting in the adulterator, and are always difficult to prove. A very large proportion of the adulterations practiced are not attempts at fraud nor designed to damage health, but are straining efforts to make money. And these efforts are so earnest and so intense, energetic, and absorbing as to leave all other considerations in the background. That the public is hurt and cheated is often but an accident rather than a malicious intention.

In place of these the adulterator is made responsible for the effects of his acts in their more definite and physical relations to the public and to the penalties imposed upon them. The offense then consists in the act of debasement, which is so easily proven by the debased article. And a pleading of absence of intent to defraud, or of the harmless character of the debasement to the individual purchaser, would simply amount to a plea of ignorance of the effects of the offense, and would be judged by the courts, not so much on the question of conviction, because the public offense of debasement has been committed, but simply as to the extent to which the adulterator should suffer in order to prevent others from similar acts through similar ignorance.

Thirdly. The making it the duty of the consumer who may be injured to prosecute the offenses, using the inspectors merely as witnesses in the prosecutions, has been carefully avoided, because it has been found that very few persons have either the inclination, time, or money to give to such prosecution, and that it is much cheaper for individuals to suffer than to prosecute.

Neither has it proved m more effective to place the duty of prosecuting upon institutions or societies, giving them the fines or other emoluments in compensation, because in this way the work has rarely, if ever, been effectively done.

Hence any law of this kind, to be reasonably effective, must embrace provisions for its own thorough and complete execution from beginning to end.

Then the organization necessary to carry into effect any such general and important law of so great necessity and so wide an application must be of exceptional and pecufitness, and therefore be very expensive, because it must consist of experts of a high order and especial training.

But just such an organization as would be necessary for such a law is now almost equally necessary for many other important objects in connection with the public health interests of every State. That this State should have been so long without such an organization, when the experience of neighboring States all around has been so unequivocal in regard to the advantages obtained, is, at least, a remarkable fact.

In consideration of this fact, it seems to this writer that no better time for the creation of a State board of health could be proposed than in connection with the enactment of a law to prevent adulterations, leaving to future laws the various other not less important duties which might be performed by a State board of health, as in the instances of Massachusetts, Michigan, and many other States.

The need for some such law as this is now so evident as to require no argument, and the advantages of State boards of health can, in view of the experience of many States, be no longer doubtful, even when no such law as this is among the duties of such boards. But whether this State would be justified in enacting so expensive a law, thereby increasing the taxes upon an already overtaxed population; that is, whether such a law would or would not be a true and wise measure of economy is not so easily seen, and requires careful thought and consideration. By a very rough estimate, based on the manufacturing and mercantile interests of the State, the losses to the population through practices of carelessness and adulteration, through over-competition and greed for money-making, which such a law is intended to check and finally prevent, cannot be less than seven hundred thousand dollars per annum, though probably much more. Then, assuming the population of the State at five millions (recently given as 4,995,000), the loss per capita per annum cannot be less than fourteen cents. The State board of health here contemplated would cost the State about eighty thousand dollars a year, without trusting to fines or emoluments to reimburse any part of such cost. This would add one and six-tenths cents to the taxes per capita per annum in order to try to save fourteen cents. But suppose such a board should succeed in preventing only one-fifth of the estimated losses by adulteration, or two and eight-tenths cents per capita per annum, it would still be a public economy of over eight per cent. per annum on a public debt which is neither unseen nor unfelt, though very much neglected, by the working classes, who suffer most by it. If such a line of argument be admitted, it is easy to see that the enactment of such a law, with such provision for its thorough execution, would be wise and economical at any time.

Laws are effectual, and therefore of use, just in proportion to the means which they provide for their own thorough execution, and any law against such offenses as adulteration which would not have full power within itself to enforce its provisions and penalties might cost little, but would certainly be useless, and, if useless, would be hurtful, by debasing and diluting the public respect for law.

The rough draft of a proposed law, which is herein submitted to the Medical Society of the State of New York, was drawn up for presentation to the joint committee above alluded to, and will probably be presented to that committee before it is presented to this society; but it is a matter of great interest and importance to this society, and if placed before the society's constituency throughout the State by means of the volume of Transactions it will doubtless attract some of that attention which the importance of the subject deserves, and may assist in obtaining some such law from the legislature.

The writer has for many years past given much attention to the subject of adulterations, and has pretty carefully watched the laws that have been enacted at home and abroad to try to check and control this rapidly increasing and insidious public evil, and having become somewhat familar with some of the very great difficulties that have been developed by the operation of the various laws, he has drawn up this draft to meet and overcome those which seemed most prominent. He has, therefore, what is believed to be a good, practical reason for every provision here asked for in such a law, and can explain the objects of the provisions, if need be, by instances of deficiency or failure in former laws. Yet it is not pretended that this draft is anything like complete and as well drawn as it should be. Some legally-trained mind should examine analytically all the convictions and failures to convict which have occurred under the British law of 1875, and all the discussions and recommendations of the British Society of Analysts charged with the execution of that law, and also the report of a commission of the German Empire charged with making investigations during two years past with a view to a law for Germany.

The British plan seems to have been to modify one law after another through a series of years, making each new law an improvement on the one preceding it, and a committee of Parliament is understood to be now engaged in amending the act of 1875 in view of recent rulings and decisions of the courts. If now this State could take full advantage of that prolonged experience by sending a trained expert to examine it carefully, as Germany did, a proper law might doubtless be framed that would be far more efficient than anything that could possibly come from such inexpert efforts as those of the present writer. In this country and in others much time has been lost to this subject by hasty enactments, passed without full knowledge of the difficulties to be met and without full investigation of what had been already done in the way of attempts and failures, or without providing effective means for enforcing the laws thus passed.

AN ACT to prevent the adulteration of food and medicine by discovering and punishing the offense, and to repeal all other acts or parts of acts in conflict therewith, and to establish a State board of health.

Whereas the public welfare is injured by the adulteration of food and medciine; and whereas the practices of adulteration are increasing, and are not easily detected by the masses of people most injured by them: Therefore,

Be it enacted by the people of the State of New York, through their representatives in the legislature—

First. That for the purposes of this law the term "food" shall include every article used for the food and drink, or in the food and drink, of man and animals.

Second. That the term "medicine" shall include every article, other than food and drink, that is used for the preservation of health or for the relief or cure of disease, in man and animals, including antiseptics and disinfectants and cosmetics.

Third. The standards by which the offense of adulteration shall be judged, or the degree in which the offense may have been committed, shall be—

For simple articles of food, a fair average quality of the substances in their natural condition; or as best prepared by drying, grinding, packing, &c., without damage from their natural condition.

For compound articles of food the publicly-known formulas, or patents, whereupon they should be compounded, or the labels or descriptions attached to the compounds as given, sold, or offered, or held in possession.

For simple articles of medicine, the standard shall be the United States Pharmacopœia for all articles embraced by that authority. For articles not so embraced, the national pharmacopœias of other countries.

And when not embraced in these, some commonly-accepted standard authority. For compounded articles of medicine, the same standards as above cited for simple articles, for all which they may embrace. For all other compound medicines the standards shall be the formula or recipe attached to the compound by label, or otherwise when given, offered, or held in possession; or the physician's prescription or recipe by which it shall have been compounded; or the patent or recipe to which the name or trade-mark of the compound applies. In the case of proprietary or private compounds, the constituents of which are legally held as secrets, the testimony of the owners of the private formulas shall be accepted as evidence of the character of the compound.

Provided, That nothing herein contained shall be construed so as to protect or permit the issue of any compound which contains any poisonous or hurtful ingredients not publicly stated and professed by the label attached to the compound when given, sold, offered, or held in possession. [Examples given for illustration: alum in baking powder; lead in cosmetics; powerful drugs in patent medicines.]

Fourth. For the purposes of this law, the offense of adulteration shall be as follows:

1st. The adding of one or more substances to another or others, whereby the strength, purity, quality, or true value of the resulting substance or mixture is reduced or lowered in its nature or composition, with the effect of tending to deceive the public by lowering such substance or mixture from its original and true value, or altering the public significance and common meaning of the name by which it is, or was, originally known or used. [Corn-meal in flour; chicory, &c., in coffee; terra alba in cream of tartar; foreign substances in powdered opium.]

2d. The substitution of one substance for another, either wholly or in part, with the effect of tending to deceive or mislead the public or any part thereof. [Artificial wines or liquors and mixtures; artificial mustard; powdered colocynth-seed for colocynth.]

3d. The abstraction of any part of any substance with the effect that the separation shall reduce the value of the substance, and thus tend to deceive or mislead by changing the common significance of the name by which, as a whole, the substance was originally applied to use. [Cream from milk; partly exhausted tea, coffee, and drugs; thymol from oil of thyme.]

4th. The application of a name commonly known or understood to indicate any substance to any part or parts thereof, or to any other substance, with the effect of tending to deceive or mislead. [Oleomargarine for butter; potato starch for arrowroot; dead oil for carbolic acid.]

5th. The presence in any substance of any impurity or any foreign matter that is either natural or accidental to it, if in unusual proportion. [Dirt in all food or medicine; metallic salts in canned provisions.]

6th. The admixture of different qualities of the same substance, with the effect of tending to deception and fraud. [Damaged wheat in flour; garden rhubarb in medicinal rhubarb.]

7th. Any debasement or dilution of any substance whereby it is reduced in intrinsic value and is yet liable to be given, bought, sold, or used as though it was not debased or diluted. [Diluted milk, vinegar, liquors, and medicines.]

8th. Any coloring, coating, polishing, or powdering, or any other alteration in the physical condition or sensible properties of any substance, with or without addition to or subtraction from it, whereby damage is concealed or it is made to appear better or greater than it really is, either in quality, weight, or measure; or whereby impurities or defective quality are partially or wholly masked or hidden, with the effect of tending to deceive or mislead. [Coloring and polishing of green coffee; powdering and coloring of damaged drugs; bread from damaged or mixed flour; "large" bread of short weight.]

9th. The giving or selling, or offering for sale, or the possession of any adulterated article by any person whose business is to make or to deal in articles of food or medicine, shall be *prima-facie* evidence of the offense of adulteration.

Provided, That it be, and it is hereby declared to be, the sole and entire object and intention of this law to protect the public against deception and fraud in the cost and quality of food and medicine through adulteration. And all the provisions of this law shall be construed and applied in accordance with its sole object, by the rules of common law.

No person shall adulterate, nor cause nor permit any other person to adulterate, any article of food or medicine, under a penalty in each case not exceeding two hundred dollars' fine for the first offense. But every offense after a conviction for a first offense shall be a misdemeanor, for which, on conviction, the person shall be imprisoned with hard labor for a period not exceeding six months.

No person shall give or sell, or offer for sale, or hold under the ordinary conditions of salable commodities, any adulterated article of food or medicine, under the same penalties as in the preceding section.

No person shall give or sell, or offer for sale, or hold under the ordinary conditions of salable commodities, any article of food or medicine which may have become, through natural or accidental causes, deteriorated or adulterated so as to be unfit for common use, under the same penalties as in the preceding section.

For the proper execution of this law, and for other purposes in connection with the public health, there shall be formed, within eighteen months after the passage of this law, a State board of health, to consist of five members, to be appointed as follows:

Within one week after this act becomes a law, the governor shall invite the Medical Society of the State of New York, through its president, to nominate through its nominating committee four prominent physicians, who may or may not be members of the society. He shall also invite the faculty of Columbia College, through its president, and the faculty of Cornell University, through its president, each to nominate one expert chemist and one physicist. He shall also invite the Bar Association of New York and the Medico-Legal Society of New York, each, to nominate, by a committee raised for that purpose, one expert lawyer. From these eight nominees the governor shall select and appoint, with reference solely to their fitness for the duties involved, two physicians, one chemist and physicist, and one lawyer; and upon his own motion he shall select one business man, who shall be, or shall have been, an experienced merchant or manufacturer; and these on being sworn in shall constitute the State board of health, and as such be empowered to sue and be sued and do all other acts, &c., for the due execution of the laws with which they may be charged.

In case of the failure of any or all of the bodies invited by the governor to nominate at their next succeeding regular meetings, it shall then be the duty of the governor to invite nominations or suggestions from any other competent prominent public bodies or individuals whose especial training and knowledge of the fitness of experts for such duties is likely to be found, and to select and appoint any or all the remaining members from such nominations or suggestions as, in his judgment, shall be best for the interests and welfare of the State.

Thus constituted, the governor shall call the board together and shall appoint from their number a temporary president and secretary. The board shall then organize and proceed to a consideration of its duties and of a plan for carrying out the provisions and intent of this law in detail. Then, after due deliberation, it shall elect by ballot from its own number a president of the board, to hold office during the pleasure of the board by annual elections. The board shall then select and appoint, not from its own number, a secretary, who shall, under the direction of the board or its president, perform all the duties of secretary, treasurer, and executive officer of the board.

This State board of health may, by a majority vote at any time, report to the governor of the State any changes in its membership that such majority may desire, and the governor shall proceed forthwith to make such changes in the way prescribed for the original construction of the board.

The offices of the State board of health shall be located in the city of New York, and the board shall be authorized to procure the necessary rooms, furniture, apparatus, and books, and to employ the clerks, messengers, and laborers that may be necessary.

The business meetings of the board shall be held not less frequently than once a month, and three members shall constitute a quorum for the transaction of business.

As soon as the State board of health shall have completed its permanent organization and have matured its plans of operation, and within three months after its appointment, it shall, by public advertisement, issue proposals for competitive examinations, to be held by the board at such times and places as may be deemed best for obtaining subordinate officers for the board. By such competitive examinations the board shall determine the qualifications of any number of persons to execute the various provisions of this law by rules and regulations adopted by the board.

From the number of persons thus found qualified the board shall then select, constitute, and appoint a board of inspectors of food and medicine, to consist at first of not less than seven members, or one for each half million of inhabitants of the State, said number to be increased from time to time as experience in the requirements of the law may indicate. The members of this subordinate board shall hold office at the pleasure of the State board of health, and removals and vacancies of all kinds shall be filled in the way prescribed for the original construction of the board of inspectors.

The State board of health shall at the same time and in the same way select, by competitive examination, from the profession of law any number of persons qualified legally to enforce the provisions of this law. From the persons thus found qualified the board shall select, constitute, and appoint a board of prosecution for legally enforcing the provisions and intent of this law by securing punishment of the offenses committed under it. This board of prosecution under the food and medicine act shall consist at first of not less than four members; one for the western, one for the middle, and two for the eastern parts of the State, and its members shall hold office during the pleasure of the State board of health, and all vacancies in it shall be filled in the way prescribed for the original construction of the board.

The duties of the inspectors of food and medicine shall be to discover the offense of adulteration and obtain evidence thereof by systematic methods to be established by the State board of health and to serve as witnesses in the prosecution of the offenses by the prosecuting officers before the courts.

For the purpose of discovering adulterations of food and medicine, and obtaining competent evidence of the offenses, said inspectors shall each obtain and examine carefully not less than ten articles of food and medicine each week, and keep a full record of the dates, methods, and results of each examination.

Each inspector shall cause it to be publicly known in his district that he will receive, for a moderate charge, to be fixed by the State board of health, all complaints of suspected adulterations, and will investigate such complaints, if need be, by the same methods as may be directed for the examinations made on his own motion, and he shall keep a full record of all complaints that may be made to him, and of his proceedings in each case, for presentation to the State board of health.

The board of inspectors shall hold meetings at stated times, not less frequently than semi-annually, to compare the experience of the members in their duties, and to secure *improvement and uniformity* in their methods of proceeding, and to preserve a concert of action throughout the State. And the board shall report the proceedings and its recommendations to the State board of health for reconsideration and action.

The board of prosecution under the food and medicine act shall hold meetings at stated times, not less frequently than semi-annually, for the same purposes as the board of inspectors, and shall report their proceedings and recommendations to the State board of health in the same way. Each member of the board of prosecution for his own district shall receive from the State board of health all cases that the State board shall order to be prosecuted, and shall prosecute all such cases in the name of the people of the State in the proper courts of law, following each case to its proper legal issue by the methods and rules of procedure in use by district attorneys. And each shall preserve a careful record of each case referred to him, and report the results to the State board of health.

The State board of health shall at its discretion provide office room, furniture, and attendants for its inspectors and law officers in their various localities.

Each member of the State board of health shall receive an annual salary of two thousand dollars, and the president of the board shall receive one thousand dollars additional annual salary: *Provided,* That any member who fails to attend any meeting of the board, or any part of any meeting, shall forfeit and lose one-twelfth part of the annual salary to which he may have been entitled for every such meeting or part of a meeting which he may have failed to attend.

The secretary of the State board of health shall receive an annual salary of three thousand dollars: *Provided,* That he gives his entire time and labor to the service of the board: *And provided,* That for any part of his time in which he does not do the duties of his office he shall not receive the pay.

Each member of the boards of inspectors. and of prosecution, shall receive an annual salary of four thousand dollars: *Provided,* That he shall be prohibited from entering into any other business or occupation than that of the State board of health: *And pro-*

vided, That he shall receive no perquisites nor fees, nor any other compensation of any kind whatever, but shall give his entire time and service to the State board of health for the annual sum of four thousand dollars: *And provided further*, That all time lost from any cause shall be deducted, *pro rata*, from his annual salary.

All authorized expenses and expenditures of the State board of health shall be audited and paid from the State Treasury upon the vouchers of the president of the board, in the same manner and by the same rules as to the expenses of the State courts are paid.

All fines and receipts of money, from whatever sources collected or received under the provisions of this act, shall be paid into the State treasury semi-annually by the president of the State board of health.

On the 30th day of November of each year, the State board of health shall report its proceedings for the year to the governor of the State; said report to be transmitted by the governor to the next succeeding session of the legislature, with such comments or suggestion as the governor may see fit to make.

BROOKLYN, *January* 10, 1879.

DRAFT OF A PROPOSED LAW TO REGULATE THE PRACTICE OF PHARMACY AND THE SALE OF POISONS, AND TO PREVENT THE ADULTERATION OF DRUGS AND MEDICINES.

Whereas the safety and welfare of the public is endangered by the sale of poisons by unqualified or ignorant persons; and whereas in all civilized countries it is found necessary to restrict this species of traffic, and to provide by law for the regulation of the delicate and responsible business of compounding and dispensing the powerful agents used in medicine; and whereas the adultration and sophistication of drugs and medicines is a species of fraud which should be prevented and suitably punished: Therefore, be it enacted, &c.

SECTION 1. From and after the —— day of ——— it shall be unlawful for any person to keep open shop for retailing, dispensing, or compounding medicines and poisons, unless such person shall be a *registered pharmacist* within the meaning of this act, and shall also conform to the regulations as to the keeping, dispensing, selling, and compounding poisons hereinafter provided; and every shop kept open for the retailing, dispensing, and compounding of medicines and poisons shall be under the direct personal care, oversight, and management of a registered pharmacist or registered assistant in pharmacy; and every registered pharmacist owning more than one such shop shall employ at every such shop, except the one he himself manages, a registered assistant in pharmacy, to manage and supervise that particular shop only.

SEC. 2. No person shall be allowed to assume, use, or exhibit the title of *registered pharmacist or registered assistant in pharmacy* unless he shall have actully been registered as such in accordance with this act.

SEC. 3. No person shall be entitled to become a registered pharmacist unless he be either a graduate in pharmacy, a practicing pharmacist, or a practicing assistant in pharmacy.

SEC. 4. *Graduates in pharmacy* shall be understood to be such persons only as have obtained the diploma of a regular incorporated or chartered *college of pharmacy* within the United States, and also persons possessing a diploma or degree from some pharmaceutical institution situated in a foreign country, said diploma being acknowledged and indorsed by the pharmaceutical board of this State as sufficient to entitle such person to be considered a graduate in pharmacy.

Practicing pharmacists shall be understood to be such persons only as at or prior to the passage of this act have kept and continue to keep open shop within this State for dispensing and compounding the prescriptions of medical practitioners, and for the sale of drugs and medicines.

Practicing assistants in pharmacy shall be understood to be such persons only as shall have attained the age of twenty-one years, and who shall have served four years' apprenticeship in a shop where the prescriptions of medical practitioners were dispensed compounded, and who shall have passed an examination by the pharmaceutical board of this State, as hereinafter provided.

SEC. 5. On or before the first day of June after the passage of this act, and every third year thereafter, on or before the same date, the incorporated colleges of pharmacy and pharmaceutical societies of this State shall submit to the governor the names of twenty pharmacists or professors in colleges of pharmacy, out of which number the governor shall appoint seven persons, who shall constitute the pharmaceutical board of the State of ———, who shall hold office for the term of three years, and until their successors shall have been appointed; and in case of removal from the State, resignation, or death, of any member, the governor shall appoint in his place a registered pharmacist or a professor in a college of pharmacy to serve as a member of the board for the remainder of the term.

SEC. 6. The duties of the pharmaceutical board shall be to examine all candidates presenting themselves; to direct the registration by the registrar of pharmacists of all persons properly qualified or entitled under this act; to cause the prosecution of all persons violating its provisions; and to report annually to the governor on the condition of pharmacy in the State, and such suggestions as they may deem expedient.

Four members of the pharmaceutical board shall consitute a quorum; they shall organize by the election, for the entire term, of a president and a secretary, who shall sign all certificates and other official documents; they shall meet at least twice a year, and shall have power to make by-laws for the proper fulfillment of their duties under this act; they shall likewise have power to prepare a list of foreign pharmaceutical institutions or colleges, the diplomas of which will be recognized as equivalent to the diplomas of colleges of pharmacy in the United States, and to indorse their approval on any such diploma when presented to them. For said indorsement they shall be entitled to a fee of five dollars.

All persons applying for examination shall pay to the pharmaceutical board ten dollars; and if passing the examination, shall be furnished with a certificate in accordance with schedule E of this act, for which certificate no fee shall be exacted or paid.

SEC. 7. Immediately on the passage of this act the governor of the State shall appoint a *registrar of pharmacists*, who shall hold office for three years, at the end of which time a successor shall be appointed, or the same person reappointed; and in case of death, resignation, or removal of a registrar before the expiration of his term of office, the governor shall appoint some person to fill the office for the remainder of the term.

A registrar guilty of any misconduct or malfeasance in office shall, in addition to the penalties hereinafter provided, be removed from office and a successor appointed by the governor.

SEC. 8. The duties of the registrar shall be to keep a book in which shall be entered, under the supervision of the pharmaceutical board, and in the form set forth in schedule B to this act, the name and place of business of every person doing business in this State who shall apply to him in the form prescribed in schedule C to this act, producing proper evidence in accordance with sections three and four of this act that he is a *graduate in pharmacy*, or a practicing pharmacist, or a duly qualified *practicing assistant in pharmacy*. It shall also be the duty of the registrar to erase from his register the name of any registered pharmacist who may have died or removed from the State, and to make all necessary alterations in the location of persons registered under this act. For the first registration as registered pharmacist, the registrar shall receive a fee of five dollars: *Provided*, That all persons in business at the time of the passage of this act shall be entitled to registration on paying one dollar.

And in order to enable the registrar to duly fulfill the duties hereby imposed upon him, it shall be the duty of every registered pharmacist, upon changing his place of business, to forthwith notify the registrar by letter of such change, and to inclose a fee of one dollar, upon receipt of which notification and fee the registrar shall make the necessary alterations in his register. And it shall be the duty of every registered pharmacist to communicate by letter to the registrar each year, on the first day of December, whether he still continues practicing pharmacy at his registered place of business, and to inclose a fee of one dollar for the insertion of his name and business address in the register for the ensuing year; and on or before the tenth day of January in each year, commencing with January, 18—, said registrar shall notify every registered pharmacist who shall not have written to him as aforesaid; and in case an answer, inclosing an additional fee of fifty cents, shall not be received by the registrar within fourteen days, such registered pharmacist shall be stricken from the register, and his name be at once reported by the registrar to the president of the pharmaceutical board: *Provided, always*, That his name shall be restored to the register on payment to the registrar of a fee of five dollars, and in case more than one year has elapsed since the date of sending the aforesaid notification, he shall also produce proper evidence of being entitled to registration, in like manner as if his name had never been registered. All aforesaid notifications sent by said registrar shall have printed on the outside an inscription directing their return to the office of the registrar, in case the persons to whom they are addressed cannot be found.

Graduates and practicing assistants in pharmacy shall, upon application to the registrar in the form set forth in schedule D to this act, be entitled to be entered as registered assistants in pharmacy at an annual fee of twenty-five cents.

The registrar shall, on written demand of any registered pharmacist or registered assistant, accompanied by a fee of twenty-five cents, give him a certificate under his own hand, setting forth in the manner prescribed in schedule H to this act that such person is so registered.

No name shall be entered on the register except of persons authorized by this act to be thus registered, nor unless the registrar be satisfied by proper evidence, in accordance with this act, that the applicant is entitled to be registered.

The registrar shall, in the month of March of each year, cause to be printed and pub-ished, as nearly as may be in the form of schedule B of this act, a correct list of the names of all registered pharmacists and registered assistants, arranged in the alphabetical order of their surnames, with their respective places of business, and the printed list shall be entitled the *Official Register of Pharmacists* within the State of ———, a copy of which, or a certificate under the hand of the registrar, shall be evidence in all the courts of this State that the persons therein specified are registered according to the provisions of this act, and the absence of the name of any person from such printed register shall be presumptive evidence that such person is not registered according to the provisions of this act; and each and every registered pharmacist within the State shall be supplied by the registrar with a copy of said official register of pharmacists, to be sent by mail free of charge, and the postage thereon prepaid.

SEC. 9. Any registrar who shall willfully make or cause to be made any falsification in any matter relating to the said official register of pharmacists, and any person who shall willfully procure or attempt to procure himself to be registered under this act, by making or producing, or causing to be made or produced, any false or fraudulent representation or declaration, either verbally or in writing, and any person aiding or assisting him therein, shall be deemed guilty of misdemeanor, and shall, on conviction thereof, be sentenced to be imprisoned for a term not exceeding twelve months, nor less than three months, and in addition thereto may be fined a sum not exceeding one thousand dollars, to be paid into the State treasury.

SEC. 10. *And be it further enacted,* That any person not a registered pharmacist, who shall, after the —— day of ———, 18—, keep open shop for retailing or dispensing of medicines or poisons, or who shall take, use, or exhibit the title of *Registered Pharmacist*, shall for every such offense be liable to a penalty of fifty dollars, to be paid to the pharmaceutical board to defray expenses, and such penalty shall be sued for and recovered in the same manner as is now provided by the revised statutes of this State for the recovery of penalties in other *qui tam* actions: *Provided, however,* That in rural districts, where there is no registered pharmacist within three miles, it shall be lawful for retail dealers annually to procure licences from the registrar of pharmacists, at a fee of one dollar, as retailers of poisons, and all sales of poisons by persons so licensed shall be recorded in a book kept for that purpose only, in the same manner as provided in section 13 of this act.

SEC. 11. And any registered pharmacist or authorized retailer of poisons who shall fail to comply with the regulations of this act in regard to retailing, dispensing, and compounding of poisons shall be liable to a penalty of fifty dollars for the first offense, and one hundred dollars for the second and every subsequent offense, and such penalty shall be sued for, recovered, and paid to the pharmaceutical board of this State in the manner provided in section 10.

SEC. 12. *But be it provided,* That nothing hereinbefore contained shall apply to, or in any manner whatever interfere with, the business of any practitioner of medicine who does keep open shop for the retailing, dispensing, or compounding of medicines and poisons, nor prevent him from administering or supplying to his patients such articles as may seem to him fit and proper, nor with the making and dealing in proprietary remedies (popularly called patent medicines), unless such medicines should be wholly or partly composed of any of the articles enumerated in schedule A, nor with the business of wholesale dealers in supplying poisons according to the ordinary course of wholesale dealing to retailers and physicians, and for use in the arts.

And upon the decease of any registered pharmacist, actually in business at the time of his death it shall be lawful for any executor, administrator, or trustee of the estate of such registered pharmacist to continue such business, if and for so long only as such business shall actually be conducted by a registered pharmacist or registered assistant in pharmacy; but if such person be not registered, he must cause himself to be registered within twenty days of his commencing to conduct the business of said decedent, under the same penalties as are prescribed in the tenth section of this act, which penalties shall be collected from the estate of said decedent.

SEC. 13. *And be it further enacted,* That from and after the —— day of ——— it shall be unlawful for any person to sell, either by wholesale or retail, any poison without distinctly labeling the bottle, box, vessel, or paper, and wrapper or cover in which said poison is contained, with the name of the article, the word poison, and the name and place of business of the seller.

Nor shall it be lawful for any registered pharmacist, or authorized retailer of poisons, to sell or dispense a poison without being satisfied that it is for legitimate use, and before delivery to the buyer, making, or causing to be made, an entry in a book kept for that purpose only, to be preserved for at least five years, and to be always open to the inspection of the pharmaceutical board, the registrar of pharmacists, the board of health, the coroner, and the officers of the different courts, stating in the form set forth in schedule F, annexed to this act, the date of the sale, the name and address of the purchaser, the name and quantity of the article sold, and the purpose for which it is stated by the purchaser to be required: *Provided,* That no article shall be considered a poison, within the meaning of this act, unless such article be enumerated i schedule A, annexed to this act, or shall hereafter be declared a poison by law.

SEC. 14. The provisions of section 13 shall not apply to articles to be exported, n to any articles forming part of the ingredients of medicine compounded in accordan with the written prescription of a practitioner of medicine; but all prescription whether or not composed in part of an ingredient or ingredients declared by this ac to be poisonous, must be carefully kept by the pharmacists on a file or in a book ke for that purpose only, and numbered in the order in which they are received or di pensed; and every box, bottle, vial, vessel, or packet containing medicine so dispense must be labeled with the name and place of business of the pharmacist so dispensin them, and be numbered with a number corresponding to that on the original prescrip tion retained by the pharmacist on his file or book, as aforesaid. Such prescriptio must be preserved at least five years, and shall be open to the inspection of the write thereof, and a copy must be furnished by the pharmacist, if demanded by either th writer or purchaser, or both, for which copy or copies the pharmacist shall not exac any fee.

SEC. 15. From and after the passage of this act, it shall be unlawful for the propri etor of any pharmaceutical shop to allow any person not a graduate or a practicin assistant in pharmacy to compound or dispense the prescriptions of physicians con taining poisons, except as an aid under the immediate supervision of said proprietor or a graduate, or a practicing assistant in pharmacy.

SEC. 16. From and after the passage of this act, all persons who shall knowingly intentionally, and fraudulently adulterate or cause to be mixed any foreign or iner substance with any drug or medical substance, or any compound medical preparation recognized by the pharmacopœia of the United States or of other countries as employed in medical practice, with the effect of weakening or destroying its medical power, or who shall sell the same otherwise than in the unbroken original package put up by the manufacturer and labeled with his name and address, or who shall sell such unbroken original package knowing the article contained therein to be thus adulterated, shall be guilty of a misdemeanor, and on conviction thereof before the criminal court shall forfeit all the articles so adulterated and shall pay a penalty not exceeding one thousand dollars, and in addition thereto may be sentenced to imprisonment not exceeding one year; said fine to be recovered and paid over to the court.

SEC. 17. It shall be the duty of the pharmaceutical board of this State to appoint for such counties where the necessity therefor is deemed to exist, and subject to the approval of the court of quarter sessions, one or more experts; and whenever a distinct charge or accusation is made, under oath or affirmation, before an alderman or justice of the peace, that there is reasonable ground for believing that any dealer or manipulator of drugs, wholesale or retail, is guilty of any of the charges specified in section 16 of this act, such accusation to be substantiated by an examination or analysis of the alleged adulterated drug or preparation by said expert, together with a sample or samples of the articles examined or analyzed, the said alderman or justice of the peace may issue authority to search for and arrest the sale of the adulterated articles until the case can be acted on by the grand jury, and, if a true bill be found, until the court decides by competent testimony for or against the defendant.

SEC. 18. All other acts and parts of acts inconsistent with this act are hereby repealed.

SEC. 19. This act shall be known as the pharmacy and poison act of 18—, and may always be so cited, described, and spoken of.

SCHEDULE A.

Aconite and its preparations.
Arsenic and its preparations.
Belladonna and its preparations.
Cantharides and the tincture.
Chloroform.
Cotton root and its preparations.
Corrosive sublimate.
Croton oil.
Cyanide of potassium.
Digitalis and its preparations.
Ergot and its preparations.
Henbane and its preparations.
Hydrocyanic acid.
Nux vomica and its preparations.
Opium and its preparations, paregoric excepted.
Oxalic acid.

Poison hemlock or conium.
Savine.
Strychnia and all poisonous vegetable alkaloids and their salts.
Tartar emetic.
Volatile oil of bitter almonds, of pennyroyal, of savine, and of tansy.
Proprietary or secret medicines recommended, sold, or advertised as emmenagogues and parturients.

SCHEDULE B.

Date.	Name.	Place of business.	Qualifications.	Remarks.
1870. Jan. 10	A. B.	329 Broadway, New York.	In business within this State prior to the passage of the pharmacy and poison act, 18—.	
Jan. 11	C. D.	Athens, Greene County, New York.	Graduate in pharmacy of Maryland College, of class of 1862–'63.	Died June 11, 1870.
Jan. 20	E. F.	280 Fulton street, Brooklyn, N. Y.	Practicing assistant in pharmacy, examined by pharmaceutical board of this State on the —— day of ———, 1870.	July 8, 1870. Removed to and carries on business on his own account at 48 John street, Ithaca, N. Y.; has passed examination of College of Pharmacy of the city of New York, June, 1870.
Jan. 29	G. H.	Middletown, N. Y., with A. B., city of New York.	Registered assistant in pharmacy. Graduate of the Massachusetts College of Pharmacy, class of 1868–'69.	September 1, 1870. Commenced business on his own account, at 136 Lake street, Buffalo, N. Y.

SCHEDULE C.

Declaration by a person applying to become registered pharmacist under the pharmacy and poison act, 18—.

To the Registrar of Pharmacists of the State of ———:

I, ——— ———, doing business (or about to commence business) at ———, in the county of ———, State of ———, hereby declare that I kept open shop for dispensing and compounding the prescriptions of medical practitioners at ———, in the county of ——— and State of ———, on or before the —— day of ——, 18—; or, am a graduate of the ——— College of Pharmacy, class 18—; or, am a graduate of the [foreign institution], my diploma having been acknowledged and indorsed by the pharmaceutical board of the State of ——, on [date]; or, am a practicing assistant in pharmacy, holding a certificate of qualification by the pharmaceutical board of this State, dated (as the case may be).

(Signed) ——— ———.
Dated this —— day of ——, 186—.
(Affidavit.)

SCHEDULE D.

Declaration by a person applying to become registered assistant in pharmacy.

I, ——— ———, of ———, hereby declare that I am a graduate of the College of Pharmacy, class 18—; or, am a graduate of the [foreign institution, date], my diploma having been acknowledged and indorsed by the pharmaceutical board of the State of ———, on the [date]; or, am a practicing assistant in pharmacy, holding a certificate of qualification by the pharmaceutical board of this State, dated ——— ———; and apply to be entered as registered assistant in pharmacy.

(Signed) ——— ———.
Date this —— day of ——, 18—.
(Affidavit.)

SCHEDULE E.

Certificate of qualification to be issued by the pharmaceutical board to practicing assistants pharmacy.

This certifies that —— ——, of ——, county of ——, State of ——, produced satisfactory evidence to the pharmaceutical board of the State of —— having served not less than four years as an apprentice in a shop, or shops, where t prescriptions of medical practitioners were dispensed; has been properly examined this board (appointed by the governor in conformity with section 5 of the pharma and poison act, 18—), and, on ballot after such examination, is declared, by a prop vote of this board, to be competent to dispense poisons and compound medicines, su ject to all legal restrictions. In testimony whereof the officers of this board hav hereunto signed their names this —— day of ——, 18—.
[SEAL.]

SCHEDULE F.

Form in which registered pharmacists and retail dealers in poisons shall keep their poison book.

Date.	Name of purchaser.	Name and quantity of poison sold.	For what purpose said to be required.	Remarks.

SCHEDULE G.

Form of license to be issued to retailers of poisons in rural districts.

I, —— ——, registrar of pharmacists, at the written request of —— ——, of ——, county of ——, State of ——, and upon his written declaration that no registered pharmacist is situate within three miles of his place of business, have, in accordance with the provisions of section 8 of the pharmacy and poison act, 18—, and upon payment by him of one dollar, do hereby issue to him this license, authorizing him to retail poisons under the restrictions provided in said act.

[SEAL.] (Signed) —— ——,
Registrar of Pharmacists of the State of ,
Office, No. *street,*
——,
——.

Date this —— day of ——, 18—.

SCHEDULE H.

Form of registrar's certificate to be given a registered pharmacist or registered practicing assistant in pharmacy.

This is to certify that ——, of —— ——, county of ——, State of ——, was entered, on the [date], at the office of the undersigned as *registered pharmacist* (*registered assistant in pharmacy*), in conformity with the pharmacy and poison act of this State.
Given under my hand and seal [town], this —— day of ——, 18—.
[SEAL.] (Signed) —— ——,
Registrar of Pharmacists.

PRO MEMORIA.

1. In its present shape, the proposed law recognizes all persons actually in business on their own account at the passage of the act as entitled to be entered as registered pharmacists.

2. All persons not then in business on their own account will have to submit to an examination, or become graduates in pharmacy, before they can become registered pharmacists.

3. The title "registered pharmacist" is applied for convenience only to those actually engaged in business on their own account.

4. The title "registered assistant in pharmacy" may be obtained by all graduates in pharmacy and (examined) practicing assistants in pharmacy.

5. Anybody may become an apprentice in pharmacy, and practically all are regarded as such until they have graduated at a college of pharmacy or have passed an examination before the pharmaceutical board; such then become *practicing assistants.*

6. The titles "graduate" and "practicing assistant in pharmacy" confer a certain standing in law, and, in consequence, a certain responsibility. All who are neither graduates nor (examined) practicing assistants are, in the eye of the law, still apprentices.

7. After an apprentice becomes a graduate or (examined) practicing assistant, he may become a registered pharmacist by opening a store.

8. The advantage a graduate possesses over a practicing assistant lies in his being entitled to become a registered pharmacist in all or any of the States (which enact this bill) simply upon the exhibition of his diploma, while a practicing assistant in pharmacy may accept a situation in any State, but cannot *take charge* or become *proprietor* of a store without being examined again in the State to which he has removed.

9. Hence it follows that while proprietors of stores are *compelled* to register annually, and for this reason ought to have a distinct title, qualified assistants, whether graduates or (examined) practicing assistants, enjoy, by virtue of their diploma or certificate of qualification, all the rights and privileges to which they aspire, and the public the proper security; these are therefore not compelled to register, though it will be their obvious interest to do so.

10. The pharmaceutical board provided for in this law is to be appointed by the governor, out of nominations made to him by the several pharmaceutical organizations, and the registration is to be under the direction of this board. It is also made one of its duties to prosecute all persons guilty of violating any of the provisions of this law.

11. The registrar is to be appointed by the governor. He is to publish annually an official register of pharmacists, which will be a valuable list, of those authorized by law to prosecute the responsible business of dispensing medicines and poisons.

12. Practicing physicians and wholesale druggists and country storekeepers located three miles from any registered pharmacist are excepted from the action of this law, but the latter class must be licensed as retailers of poisons.

13. The provisions regulating the sale of poisons correspond nearly with those of the existing laws of some of the States. That restricting the independent compounding of prescriptions to graduates and assistants should be carefully considered by the association before its adoption.

14. The provisions for the conviction and punishment of adulterators of drugs and medicines, and for the prevention of the sale of the same, are believed to be such as public sentiment demands; and, whether found efficient or not, may be well enacted into law as a terror to evil-doers.

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THE ADULTERATION AND DETERIORATION OF FOOD.

By R. C. KEDZIE, *president of the State board of health of Michigan.*

While food is a prime condition of the existence of every form of animal life, wholesome food is a necessary condition for the higher types of human existence. The kind and quality of food have much to do directly with the physical development of a nation, and indirectly with its moral advancement. The imperious demands of the animal life, where its wants are imperfectly met, overshadow the promptings of the moral nature. A hungry man is, for the time, a savage; if the hunger is chronic the savagery becomes equally enduring. The persistent gnawing of an empty stomach will obliterate sentiment and drown conscience alike in the Ute and Celt, in Hindoo and Anglo-Saxon. Cobden says, "Without a full belly there is no religion, and without a whole pair of breeches no morality."

Fortunately for our own people the question of food supply does not press upon us for solution. America is the land of overflowing abundance. While we have enough for daily feasting from New Year's bells to Christmas chimes, we are yet the almoner of Providence to the nations of Europe to preserve her teeming millions from suffering and want, if not from famine.

Yet, with our amazing abundance of materials for food, it is questionable whether we eat better food than the inhabitants of the Old World. It is obvious that the abundance in quantity and excellence in quality of our own provisions do not in themselves necessitate a corresponding excellence in our food. We may fall short of the best results in alimentation for three reasons: 1, bad cookery; 2, deterioration; 3, adulteration.

Good cookery is that which develops all the nutritive materials in provisions, and presents them in their most appetizing and digestible form; any other kind of cookery is bad cookery. Perhaps as much food is wasted by bad cookery as is consumed upon our tables; and of the food we eat, one-half the food value is destroyed by bad cookery. Some one has said, "Americans have the best provisions and the poorest food." A Frenchman poured out the bitterness of his soul in the exclamation: "What a peoples! Fifty religions and only one gravy!"

I do not propose at this time to discuss the subject of the preparation of food for the table, although it is a matter intimately connected with health. I confine my attention to the *deterioration* and *adulteration* of substances used for human food in the United States.

The cereals occupy the most prominent position among the food materials of our people, and wheat holds the first rank among the cereals. Wheat comes nearer a perfect food than any other vegetable production, because it contains an abundance of both the nitrogenous and carbonaceous elements of food, with an ample supply of the phosphates and other mineral substances required for animal nutrition. A chemical analysis of seventy-seven specimens of wheat and wheat flour made in this laboratory in 1877 discloses the fact that in only one instance was the quantity of albuminoids in flour found to be less than 9 per cent., and in only five specimens was it found below 10 per cent. The quantity of albuminoids is ample for the sustenance of the human system and for securing the complete digestion of the carbonaceous constituents of the flour. The large amount of nitrogen and phosphorus in wheat make it pre-eminently the food of brain-workers; and one cause of the intellectual activity and energy of the people of the United States may be found in the large consumption of wheat bread.

DETERIORATION.

Wheat may deteriorate:

1. *By being cut at the wrong period of growth.* By allowing the grain to overripen or become "dead ripe," a portion of the digestible carbohydrate becomes converted into indigestible woody fiber, the product of flour is diminished, and its quality lowered. An elaborate investigation into the composition of the wheat berry at different stages of growth is now being carried forward at this laboratory; the analyses have not all been completed, but enough to show that there is a marked increase of cellulose in overripe wheat.

2. *By development of diastase by sprouting of the grain*, by which a part of the starch is converted into sugar in the process of bread-making, giving a brown, sodden, sweet, sticky mass instead of light and crisp bread. The period of wheat harvest in 1857 was so rainy in the Western States that the wheat sprouted before it was harvested, and flour of a very poor bread-making quality was the result. Some persons reasoned that the grain must have lost some material or principle by sprouting, and concluded this must be alcohol, the restoration of which to the flour would remove the difficulty in bread-making; but the incorporation of alcohol with the sponge or dough was found to have no influence in retarding the transformation of starch into glucose, and "the bread still fastened the jaws together just as in chewing wax."

They next tried to check the action of the diastase in the flour by using a solution of alum in making the bread. The appearance of the loaf was greatly improved, but the dietetic value of the bread was greatly diminished by the alum. Lime-water was found to be as efficient as alum in checking the sugar-forming tendency in this flour, with much less injury to the quality of the bread. A peculiar nitrogenous material called cerealin lies near the bran in the wheat kernel, which has a transforming influence on starch similar to that of diastase. When whole wheat flour ("Graham") is used in making bread the loaf is sweet, sticky, and brown in color, not alone from the color of the bran, but because the cerealin has transformed a part of the starch granules into dextrine or sugar, thus destroying in part the white color of the starch. A whiter and less sodden loaf can be made from this Graham flour by the use of lime-water, which is found to have a similar control over the transforming power of cerealin that it has over diastase; the small amount of lime used would not injure the bread, but would serve to correct any acidity produced in the panary fermentation.

3. *By heating, banking, or even molding*, when kept in large bulk, especially when not thoroughly dry. Wheat thoroughly air-dry may be kept indefinitely without loss of vitality or of food value; but when it is even moderately moist and is kept in large bulk it rapidly deteriorates. This change is mainly confined to the nitrogenous constituents of the grain; the gluten becomes weak and incapable of fine vesiculation, and such altered gluten often acts as a ferment, changing the carbohydrates into lactic and acetic acids. For these reasons the bread made from the flour of such wheat is liable to be heavy (unvesiculated) and sour.

WHEAT FLOUR.

Flour may be of inferior quality because of deterioration of wheat from causes already noticed, or it may be deteriorated from any of the following causes:

1. *Improper grinding and dressing.* In all ordinary processes of grinding, the friction of the rapidly revolving millstones against the grain, or even of the stones against each other, develops a large amount of heat, so that the crushed wheat comes from the stones quite hot; the joint action of heat and mechanical pressure seems to liberate water from a quasi-chemical combination in the grain, so that wheat which is apparently dry in the hopper comes from the millstones steaming freely, so that the freshly-ground wheat appears hot and damp. Heat alone will liberate water in stale bread in a similar manner; if a dry loaf be inclosed in a tight tin box and heated in a dry oven to 212°, the loaf becomes soft and moist like new bread. If the crushed wheat is aired and cooled, most of the water set free by grinding again enters into

intimate combination, so that the flour appears dry although it contains 10 to 12 per cent. of water, just as the loaf revived by heat soon becomes dry and crumbly. A part of the water, however, has permanently escaped, for the flour usually contains one-tenth less water than did the wheat from which it was ground.

But the changes effected in grinding are not confined to variations in the amount of water. Where the stones are set close to produce a large amount of flour and are driven at a high rate of speed to grind as large a quantity of grain as possible in a given time, and where the cooling of the heated mass is imperfectly done, serious changes are made in both the carbohydrates and the albuminoids of the grain. Mitscherlich has shown that wheat which contains no sugar may yield, after being ground, as much as 4 per cent. of sugar. This transformation of the starch into sugar could not be produced otherwise than through the internal action of the gluten aided by air and superabundant moisture. When once the action sets in it quickly passes through the whole heap if not speedily checked either by cooling or drying the flour. The decomposed starch or sugar, when the mass is left to cool gradually in large heaps, soon enters upon the alcoholic and sometimes even upon the acetous fermentation. This action always takes place in the middle of the heap first and proceeds toward the surface—the air enveloped in the flour and the heat produced by the transition of starch to sugar and alcohol successively favoring the change most in the center. The affected flour has a gritty feel, not unlike that of gypsum, and of course makes very unwholesome bread. (Muspratt's Chemistry, volume 1, page 366.)

The deterioration in the nitrogenous constituents of the flour is more marked and more injurious than any changes in the carbohydrates. Not only has the gluten acquired the properties of a ferment, but its vesiculating power is greatly impaired, so that heavy and sour bread is the usual product of such flour. Many years ago, when I was engaged in the practice of medicine in a very new and sparsely settled part of this State, I was accustomed to provide my yearly supply of flour by selecting very choice wheat and sending a load of twenty-five to thirty bushels to be ground at one time, because the grist-mills were fourteen miles away in three directions. A grist ground at one mill never yielded a light and sweet loaf of bread; it was a year of "unleavened bread." Another grist of similar quality of wheat made a quality of flour which never failed to make light and sweet bread. So difficult was it to secure good and prompt vesiculation with the former kind of flour that the wife very forcibly called it "dead." It was dead beyond resurrection, for it never rose again. Such overground and overheated flour is usually of a bluish-white color instead of a light golden tinge; it is non-coherent, and when it has been compressed in the hand it breaks down into a more or less powdery mass when the hand is opened, instead of retaining the form impressed upon it by the hand. Good "lively" flour will usually give a cast of even the fine lines and markings of the interior of the hand which has compressed it, while "dead" flour will fail to exhibit this in any marked degree. The feel of such flour is also harsh and gritty rather than soft and velvety.

I regard the excessive heating in grinding as the primary cause of this deterioration in flour; imperfect aëration and tardy cooling of the flour exaggerate the bad effects of improper grinding. Many persons claim that irregularity in the action of the motive power by which the revolutions of the millstones are secured causes a liability to this deterioration, because too rapid motion will injure enough of the flour to initiate the changes which may extend to the whole mass. For this reason they prefer mills where falling water is the motive power rather than steam. This objection to steam power can only be valid where the governor works imperfectly.

2. *Flour deteriorates by improper storing.* While wheat in good condition may be preserved unchanged for an indefinite period, flour is very liable to change. An obvious explanation of this fact comes from the great increase of surface in consequence of minute subdivision in grinding, causing a corresponding increase of exposure to atmospheric influences. The action of the air and moisture is therefore vastly greater on the finely divided flour than on the compact cuticle-covered wheat. The very breaking up of the nitrogenous tissue of the wheat kernel in grinding seems to promote molecular changes in the flour, just as an egg will putrefy for being so violently shaken as to break up its internal structure. Viability of structure seems to be a conservation force. But all the natural safeguards which nature has thrown around the gluten of the wheat berry are broken down in flour; and this substance, so complex in chemical composition and so liable to change, is left exposed in an exaggerated degree to the action of the natural forces which produce decay.

Hydrated gluten is especially disposed to putrefactive decomposition. In flour the gluten is in the powdery form until it combines with a certain amount of water; but if it absorbs this quantity of water from the air or any other source, it will undergo molecular change—much more rapidly if the temperature is elevated. If, therefore, the flour is stored in a damp place, or kept at a temperature above 75° F., and especially if exposed to the joint action of these two conditions, it is very liable to serious impairment of dietetic value. This may be secured when the molecular changes stop far short of putrefactive decomposition. The office of the gluten in flour is both physiological and physical; for the first, it serves as a plastic material in the repair of tissue-waste; for the second, it secures that vesiculating quality in dough which renders light and digestible bread possible. Gluten performs the same office for bread that white of eggs does for sponge-cake. Every cook knows that white of eggs may lose its peculiar sticky and adhesive quality—the power of entangling and holding bubbles of air, by reason of which it may be beaten into a persistent foam—long before it has acquired the least odor or taste which would forbid its use as food. In a like manner the loss of the sticky property of the gluten may long ante-date its putrefactive decomposition. The loss of vesiculating power is the first downward step in the deterioration of flour.

It is surprising how rapidly such changes may take place in flour of good quality. In some experiments upon the vesiculating qualities of a larger number of specimens of flour, this deterioration was forcibly brought to my attention. A specimen of flour of Tuscan wheat was found to have gluten of high quality. I separated by washing the gluten from four ounces of the flour, and baked the pat of gluten in a "quick oven," when the gluten, distended by the steam generated by the heat, swelled up into a plump and evenly vesiculated ball, measuring 117 cubic centimeters. The flour, in a common paper sack, was set aside in a damp closet for two weeks, at which time I desired to obtain a gluten ball from 100 grams instead of the four ounces. I separated the gluten from this quantity of flour and baked it as before; but, instead of the puffy ball, I only obtained a small gnarly lump, measuring 30 cubic centimeters instead of 117. I tried the experiment repeatedly, but with no better results. The gluten had lost almost entirely its vesiculating property. I tested the value of the gluten in other ways, but only to show the same fact. The gluten had not disappeared, but had "lost its grip."

Flour is often damaged by being kept where it will absorb bad odors. Perhaps no food-material, except milk and the products of the dairy, is more sensitive to bad odors than flour. It should never be stored in the same room with strong-smelling vegetables or fish, nor where the nameless odors of the kitchen may reach it. Anything that taints the air of the room will impart the same smell to the flour stored in such room. It should be kept in a dry, airy room, exposed neither to extreme cold nor to great heat.

The quality of their bread is so intimately associated with the health of a people that it becomes very important to have some cheap and easy method of testing the quality of any flour in respect to bread-making. An "organic combustion" will give the data for estimating the total albuminoids, but this can only be made by a chemist, and even this does not determine the vesiculating quality of the flour. In bread-making, the *quality* of the albuminoids is as important as the *quantity*. Flour that contains a moderate amount of *strong* gluten will make better bread than flour which contains more gluten which has become weak and incapable of persistent vesiculation. I offer the following

METHOD FOR TESTING THE QUALITY OF FLOUR.

Gluten is insoluble in water, but is soluble in a solution of caustic soda. A solution of monocarbonate of soda will partially dissolve the gluten, forming a glairy mass like white of eggs, but the bicarbonate of soda has only a feeble solvent action on gluten. If a solution of gluten is made with a dilute solution of carbonate of soda, and carbonic acid liberated by the action of an acid, the bubbles of gas will be retained by the gluten in proportion to its vesiculating quality; if the gluten is strong the vesicles will be fine and will not rapidly break with the escape of gas, causing subsidence of the foam, nor will they coalesce with each other with the formation of larger bubbles and ragged cavities. But if the gluten is of poor quality the vesiculation will soon break down in the manner indicated.

Test solutions.—Dissolve 3½ ounces of crystals of carbonate of soda (sal soda) in 24 ounces of water; weigh out 60 grains of the flour to be tested; place this in a porcelain or glass mortar; add one-half fluid ounce of the alkaline solution; rub this up with the flour till every part of the flour has been acted upon by the alkaline carbonate; let the whole stand for an hour; then pour the mixture of flour and alkaline carbonate into a tall glass vessel (an "oil-sample" bottle or hydrometer jar will answer the purpose); wash out the mortar with two ounces of water and add this to the flour mixture; intimately mix the materials by inverting the bottle once or twice; then add one-half a fluid ounce of the acid solution made by dissolving 2 ounces of crystals of tartaric acid in 24 ounces of water; mix the whole carefully by inverting the bottle, and place it upright to observe the vesiculation. If the gluten is of good quality, the bubbles for the first five minutes will be almost invisible; they will coalesce very slowly and in a quarter of an hour only a few large bubbles will be seen near the top of the foam; at the end of an hour the surface of the liquid will still be covered with froth. If the fine vesicles rapidly change, the foam falls in a short time, and the surface of the liquid is bare of foam in any part, the flour is poor and will not make evenly vesiculated bread when raised by the panary fermentation.

By treating a number of specimens of flour in the same way, in vessels of the same size and at the same temperature (60° F.), it is easy to compare their bread-making qualities. In making such comparison it is very important to have the conditions alike, especially the temperature.

ADULTERATION OF FLOUR.

European writers have much to say about the adulteration of flour, which seems to be a frequent practice in the Old World. I have examined a large number of specimens of flour in this State, but have never found an adulterated article. I think that adulteration of flour is not common in the United States. We "have bread enough and to spare," and the profits of such dishonesty would hardly pay for the trouble.

INDIAN CORN.

In many parts of our country corn in various forms is largely consumed as food. If more care were exercised in preparing it for the table, its use would be much extended and its digestibility increased, because its food value is generally underestimated. All persons recognize the delicious qualities of green corn, but the ripened grain affords a nutritious and sapid food. The analyses made in this laboratory last year of thirteen leading varieties of Indian corn (air-dry) give an average of 11.09 per cent. of albuminoids, 4.93 per cent. of fat, and 6.23 per cent. of sugar and gum. The sum total of albuminoids is but little below that of wheat, but the want of gluten deprives meal of the vesiculating properties of flour. The meal contains more fat and soluble carbohydrates than flour, and consequently makes a more sapid food than flour. Some persons complain of a harsh and rough taste in the products of Indian meal, but this may be remedied by prolonged cooking. The presence of so large an amount of fat renders meal, especially if finely ground, peculiarly liable to become rancid and bitter, the difficulty constantly increasing with age, particularly when improperly stored. This deterioration may be prevented or avoided by coarse grinding, keeping in a cool place, and by not keeping for a long time in the form of meal. The whole grain may be kept for a long time in good condition, while the meal rapidly deteriorates. It is better to use the recently-ground meal. In hominy there is less tendency to change, because the grain is not comminuted as it is in meal, and much of the fat is removed by the alkaline solution used to remove the hull.

Adulteration.—Corn meal is too cheap an article to be adulterated, and I have never heard of adulteration of this material in this country. It is sometimes gritty from the presence of earthy matters by reason of careless handling.

OAT MEAL

is coming into more general use, especially as a side dish for the breakfast table. It contains a large amount of phosphates, and hence is well suited for food of adolescents. It is rich in fat and liable to deteriorate from the same causes and in the same way as Indian meal.

BUCKWHEAT

affords a highly-prized breakfast dish for the winter season. Buckwheat flour is very often adulterated with shorts, the similarity in the physical properties of the two substances rendering such adulteration easy to conceal. This adulteration is now carried to such an extent that the peculiar quality and taste of buckwheat almost wholly disappear from the old-time favorite pancake.

GARDEN VEGETABLES

form a considerable part of the daily food of our people, and their use should be increased rather than diminished. The deplorable consequences of their entire absence or too limited use are written in the history of the scurvy, once the scourge of the sea. They are a valuable addition to our food by affording agreeable variety and by diluting the two concentrated foods which form the basis of our living. Most of these vegetables are very succulent and readily undergo change, either by losing water, becoming wilted and insipid, or by incipient putrefactive decomposition, as is shown by mold and mustiness. We must be on constant guard against this tendency to deterioration, especially when the vegetables are not brought fresh from the garden. The whole subject of market vegetables, as related to the public health, has been so ably treated by Dr. S. C. Busey, in a paper read before the American Medical Association, that I need not repeat what he has so well said. The one safe rule in regard to all vegetables for human food is that they must be fresh, crisp, free from wilting and the least tendency to mold and mustiness. Better eat dry bread than re-enforce this with vegetables which have turned the corner towards putrefaction.

The value of roots and tubers depends much upon the kind of soil in which they have grown. Potatoes, turnips, beets, and celery are much better when grown in a soil containing much vegetable matter. This is especially seen in potatoes, which are best when grown upon virgin soil, next best when grown upon plowed-up greensward, and poorest when grown upon stiff, undrained clay, dressed with unfermented manures. Those raised upon the first kind of soil will cook dry and mealy; those raised upon the last will be waxy and strong.

All these vegetables deteriorate by exposure to air and light. Their growth was subterranean, and their complete preservation from deteriorating demands a similar seclusion. Poisonous alkaloids develop in the potato and celery when exposed to light, and I strongly suspect the same tendency in the parsnip. A potato which has lain all winter in the soil in which it grew is found to have a very different quality from one which has been wintered in the cellar in the usual way. These vegetables can be preserved from serious deterioration by placing them in tight boxes or bins in the cellar, covering them from the light and air by a blanket till "the sweating period" has passed by, and then sifting over the surface a thin but continuous layer of soil rich in vegetable matter. This layer of soil should be renewed from time to time (if it has been disturbed by removing vegetables), so as to exclude light at all times, and prevent too free access of air. The lower the temperature, short of actual freezing, the better.

FRUIT.

The direct food-value of fruit is small, but its demulcent and refreshing quality gives it value, and the influence of the vegetable acids is important in maintaining good health. As a general rule, fruits are best when ripened on the parent stem, and they are in the best condition when first plucked.

There are some fruits which will ripen or color after removing from the parent stock, such as the tomato and orange, and in a less degree the peach and grape; but such color-ripening is a delusion as compared with results which may be reached in nature's way. Such sham-ripened fruits should be rejected whenever better-ripened fruit can be obtained. A striking exception to this rule of excellence by ripening on the parent stem is found in the pear and apple. The final ripening of these fruits consists mainly in the transformation of the pectose, which causes the woody hardness of the full-grown but unripened fruit. The transformations of pectose into the gelatinous acids of this group are found to take place more certainly and uniformly when the temperature is uniform and with limited exposure to the air. If, therefore, the pear and apple are removed from the tree whenever the stem will freely part by lifting the fruit, and such fruit is placed in drawers or boxes protected from too free exposure to air and kept in nearly uniform temperature, the pear of woody hardness is ripened into a luscious lump of buttery softness that fairly melts in the mouth, while the amount of sugar and the aroma are increased also by this house-ripening. The same is true to a less extent of the apple. To secure the best dietetic effects these fruits should always be house-ripened. Perhaps the high esteem in which American apples are held in England and French pears in this country is an indirect result of the house-ripening resulting from long transportation.

The method of preserving fruits in the fresh state by canning has been carried to such perfection that little need to be said on this subject. Glass jars are now made of so good quality and so cheap that they ought to drive tinned vessels out of the trade in preserving acid fruits. When we consider that tin is becoming so frequently alloyed with lead, and that the tin salts themselves, which may be formed by fruit acids, are injurious to the health, this conviction becomes more fixed. The most promising way to make tin vessels safe for such purposes is to electroplate the inside of the can with silver, as is done by a canning house in Baltimore. The method of preserving bottled fruits by adding a solution of bisulphate of soda (Spear's preserving fluid) has gone into disuse. Another secret preparation is now taking its place, and is sold at a high price as a secret preserving material. On analysis I find this to be crystalized boracic acid. Water containing 2½ per cent. of boracic acid preserves fresh fruit without change of form or color, and appears capable of doing so for an indefinite period.

This mode of preservation is admirable for exhibition of fresh fruit, since the most delicate colors are not changed by the solution. I have not made any experiments to test its influence on the taste or wholesomeness of fruits. "In Sweden boracic acid is extensively employed for the preservation of meat and milk; and while it forms a sufficient antiseptic, food prepared with it is said to be perfectly fit for use." (Encyclopedia Britannica.)

ANIMAL FOOD.

Meat is an important constituent in the diet of our people. Probably no other agricultural nation consumes so large a proportion of animal food. When we consider meat either with respect to its carbonaceous (fatty) or its nitrogenous (muscular) constituents, we find it the most condensed form of food. The preservation of such food material from loss or deterioration is a matter of great importance. The proper keeping of meat implies something more than saving it from putrefaction; it must be kept in such a way as not to lessen its digestibility or its appetizing quality. Both these qualities are found in their highest perfection a short time after the animal has been slaughtered, and while it is still in the condition of "fresh meat." All forms of preserved meat, whether kept by drying, smoking, or salting, bear a similar relation to fresh meat in human food that hay does to grass in animal fodder; the less change in either material from the original condition, consistent with preservation, the better for food purposes. One important condition in the keeping of meat is that the natural salts shall be extracted the least possible. The presence of such salts as the phosphate and chloride of potassium contribute to the digestibility of meats, and they are essential to their palatability. When meat has been entirely deprived of extractive salts by prolonged boiling, it has been found that it will not sustain animal life, and that dogs will starve though abundantly supplied with such meat.

New England farmers, who annually salt down beef for family use are accustomed to carefully preserve their beef brine from year to year, estimating it quite a misfortune to lose their brine; they scald their brine from time to time, to coagulate and remove the dissolved albumen; it is not, therefore, the dissolved animal matters in the brine which makes it valuable, nor is it chiefly valuable for the trifling cost of salt and sugar for the brine, but they have found by experience that old brine will keep beef sweeter and more palatable than will new brine. The reason is that the old brine has become thoroughly charged with the soluble salts of fresh beef, and will therefore extract less of these salts from fresh beef than will new brine, and the meat preserved in such old brine is kept more nearly in its original condition. If such is the fact, it would be a good plan to dissolve a quantity of the phosphate and chloride of potassium in new brine, and thus prevent the diffusion of these salts into the brine. The method of preserving lean meat by the exclusive use of common salt is objectionable, because so much is required for this purpose that the meat becomes hard, tough, and difficult of digestion, and almost inedible. The addition of nitrate of potash, which prevented the absorption of such a large quantity of common salt by the meat, and also in some degree limited the diffusion of the potash salts, was an improvement on the old salt-junk; the addition of cane-sugar to replace a quantity of the salt was a still greater improvement. In "sugar-curing hams" some parties have substituted glucose in the place of cane-sugar, with very unsatisfactory results. Hams cured with starch sugar are more liable to mold; when the meat is boiled or fried, the glucose blackens by the heat and becomes so bitter that it is hardly fit to eat. The method of curing meat by external application of salt and other antiseptics is faulty, because a quantity in excess of what is required for the external portions must be used in order that the interior parts may receive an adequate supply through the excessively salted outside. If we could transfuse throughout the carcass the necessary salts by means of the blood-vessels, we might use what is needed and just the quantity required for curing the meat of any animal, thus avoiding all injurious excess.

According to the following extract from the New York Tribune, this has been successfully accomplished in Australia:

"The latest Australian device for preserving meat is the injection of weak brine into the blood-vessels (soon as the animal is laid bare) from an elevated tank, through a pipe inserted in the left ventricle, driving out the blood through the right ventricle, after which a stronger brine is forced in until all the veins are full. It is stated that the distribution of the salt is thorough and the carcass perfectly preserved."

The Australian method might be improved by dissolving in the fluid for injection, in addition to common salt, sugar and nitrate of potash, or even creosote in small quantity if the smoky flavor is desired in dried meats. Meat injected with antiseptic solutions could be transported to Europe in the whole carcass without refrigeration, except in very warm weather; meat cured *from within* by this process is equally cured in all its parts, and the largest carcass can be as effectually cured as the smallest cuts. Meats cured in this way may be treated with only such quantity of antiseptics as is required to preserve them from decomposition, and to render them most acceptable to the palate. No loss of salts by diffusion into the brine is possible, as no brine is used.

In the curing of smoked meats, such as hams and bacon, the method of internal curing promises excellent results. In sugar-curing hams in the dry way, it is difficult to secure such penetration of the curing material as to preserve the deeper portions lying near the bone. Dealers usually explore this part of the ham by thrusting in some instrument; when this brings out no taint when withdrawn, the whole ham is pronounced sound. If a nozzle, conveying a solusion of salt, sugar, creosote, &c., could be inserted into the femoral artery of a fresh ham, and by hydrostatic pressure this preservative liquid could be forced into every part of the ham, we could then feel assured that the ham was cured throughout without any loss of natural salts, and with the least possible deterioration of food value. Such hams could be dried to any desired extent and then brushed over with a solution of silicate of soda, which is a energetic antiferment, and which might replace the sacking and whitewash now use to keep hams from insects.

OTHER ANTISEPTICS.

Boracic acid.—I have already spoken of the use of boracic acid in Sweden for th preservation of meat.

Sulphurous acid.—For preserving cuts of fresh meat for a short time, fumigatio with burning sulphur has been highly recommended. Cuts of fresh meat are freely suspended in a tight box, beneath which a quantity of sulphur is burned so that th fumes may come freely in contact with the entire surface of the meat, which is le suspended in the gas for an hour or two. The surface of the meat is blanched somewhat, but the meat will keep free from all taint for many days, even in the hottes weather. It is claimed that such meat is not injured in the least by the sulphurou acid, and that no person eating such meat, when it has been cooked in the usual way, can distinguish it from fresh meat.

PORK.

In preserving fat meats the packer usually relies almost wholly upon common salt. If this is a good quality of coarse-grained salt, so as to insure the absence of the salts of lime, the packer feels assured that he will have no trouble in securing his pork, but he looks with suspicion on salt containing any appreciable quantity of lime in any form.

The salts of magnesia seem to be much more objectionable than those of lime. In his chemical reagents the chemist finds that solutions of magnesian salts are more prone to develop low forms of life than solutions of lime salts; germ development seems to be promoted by magnesia more than lime, and putrefaction is the result of germ development.

When pork is poorly cured it acquires a peculiar kind of taint popularly called "rust"; the pork, though not putrid, is yet unfit for food, and no one will eat it except from necessity. But pork which is well kept is still widely different from fresh pork, however much salt may be added to the latter in cooking—having lost an indescribable and peculiar sweetness of taste. Pork which has been cured so as to preserve this sweetness of taste has greater dietetic value. I have found black pepper very effectual in preventing any undesirable change in pork, and I use it in the following way in packing pork: The bottom of the barrel is first covered with coarse salt in the usual way, upon which a layer of pork is tightly packed; upon this ground black pepper is dredged until the surface is well blackened; then a layer of salt, then pork peppered as before, and so on until the barrel is filled. In a few days brine is applied in the usual way. Such pork will remain sweet for a long time, and can hardly be distinguished from fresh pork when prepared for the table. The deterioration of pork by the growth of *trichina spiralis* has given pork-eaters a rude shock. The remedy for this trouble is simple—eat no pork in any form that has not been thoroughly cooked

EGGS

are of themselves very valuable as food, and they are highly prized by the cook for their fine vesiculating quality. But they are very liable to change, and unless very carefully preserved they soon "survive the period of their usefulness." They are fit for food only when their reputation is above suspicion. In the transportation of eggs it is nearly as important that their internal structure should remain unharmed as that their envelope should remain unbroken. An egg whose "cover has slipped off" is difficult to handle, but an egg whose interior integrity is destroyed, soon is not worth handling.

The method of keeping eggs in a weak brine is unsatisfactory on account of hardening the yolk and loss of vesiculating property in the albumen. I think better results can be obtained by making a pickle for the eggs with a weak solution of boracic acid, one-third of an ounce of acid to a pint of water. The silicate of soda might be used with good effect; the eggs might be varnished with a strong solution of the silicate, or a pickle made by dissolving one part of the dense solution of the silicate of soda in ten parts of water.

MILK.

Milk comes nearer a perfect food than any other natural production. It is the universal food of the infant mammalians, and even adults use it largely for food. Many tribes distinguished for their physical endurance use milk as a leading article of diet. But, while good milk is a wholesome food, milk that has been carelessly handled and not protected from contamination has sometimes proved a vehicle for the dissemination of typhoid and scarlet fever. In most of these cases it has been supposed that the fever-poison found its way into the milk by contaminated water used in washing the milk pails, or in impure water used to adulterate the milk. But in a few well-authenticated cases it would seem that the milk of cows provided with impure drinking water may itself be a cause of typhoid fever in persons using such milk for food; and this when the cows did not appear to suffer in health from the use of such water. For a very striking illustration of this subject I refer the reader to the report of Dr. T. H. Everts in Transactions of American Medical Association for 1876, page 432. In order that cows may give wholesome milk they must have good food, pure water, and clean surroundings, and the last condition is not least in importance. Can a clean thing come out of an unclean?

Milk being a very complex organic substance, tends to rapid deterioration. Many methods have been proposed to keep milk from deteriorating, such as bottling the scalded milk, condensing it to small bulk and adding cane sugar; the addition of alkaline substances to neutralize the lactic acid as it is formed, thus preventing the separation of the casein; or the addition of a small amount of some antiseptic substance, such as boracic acid or silicate of soda, to prevent the transformation of sugar of milk into lactic acid. Many of these plans seem to be based upon the assumption that the coagulating of the milk is the single change to be prevented in order to preserve milk, and if it can be kept sweet for any length of time its food value will continue unimpaired. But the curdling of milk is only one of many undesirable changes to which milk is liable. Milk is valuable for food because there is such an intimate combination of fat and casein in new milk; by long standing the fat will almost wholly rise to the surface (more rapidly if the milk remains fluid), and a permanent separation takes place between the two classes of food. The longer milk is kept, even if no souring takes place, the poorer it is for food. Freshness in milk should be the thing sought, rather than the use of delusive antiseptics. Antiseptics in food are the by-paths to indigestion.

Adulteration.

The one adulteration to which milk is liable is water. In a few instances other substances have been found, such as sugar or glycerine and chalk, which have been used to bring up the specific gravity when water has been used, but all other adulterants are but a drop in the bucket in comparison with the lake of water which has been fraudulently poured into milk.

SACCHARINE FOOD.

I place sugars and the whole class of sweets in a section by themselves, not because they differ essentially from other carbo-hydrates in food-value, but because they are used principally for their sapid quality, rendering insipid food not only more palatable but more digestible in consequence of the augmented secretion of digestive fluids. The keen relish with which the young receive this class of food seems to indicate that it has some intimate relation to the rapid formation of new tissue. Nature throws out a broad hint on this subject in the large amount of sugar found in milk. One striking feature of American diet is the large consumption of sugar in our food.

Dr. Letheby estimates that Anglo-Saxons annually consume an average of 41.4 pounds of sugar for each person; the Latin race 12.34 pounds; the Teutonic 7.3 pounds; Russians and Turks only 3.3 pounds. The large consumption of sugar is a modern innovation; the use of sugar in food was unknown in ancient times, and the word sugar is not found in the Bible. Solomon somewhat dogmatically asserted that "there is nothing new under the sun," yet he would have opened his eyes wide in royal astonishment if a lump of loaf sugar had been placed in his hands and thence transferred to his mouth. The solitary food-sweet of Biblical times was "honey in the honeycomb." Sugar in small amount was known to some of the early nations, but it was used as a rare and powerful medicine.

In absolute food-value there is no very wide variation among the different sugars; the most marked difference in chemical composition is that one kind of sugar contains one molecule more of water, with a corresponding loss of potential force. A sensation has lately been produced by the statement that glucose or starch-sugar is unwholesome, because it is identical in composition with the sugar found in diabetic urine, and the inference has been drawn that glucose would produce *diabetes mellitus*. Starch itself, and cane sugar, are both changed into glucose in the process of digestion. If glucose were as efficient in causing renal disease as some suppose, the grape-eating races of men should long ago have been wiped out of existence by diabetes, for the sugar of grapes is glucose. Pure glucose is as wholesome as any kind of sugar. When I say that the absolute food-value of glucose and of sucrose is very nearly the same, it does not follow that a person may not be defrauded by the substitution of glucose in the place of sucrose. Such person may have just ground for complaint, for the following reasons:

1. We use sugar almost entirely *for its sweetness*, and not mainly for its general food-value. Two pounds of sucrose will sweeten as much as five pounds of glucose; pound for pound, we only get two-fifths of our money's worth when using glucose in place of sucrose.

2. Glucose is much more prone to mold and decay than sucrose under the same conditions. I have a specimen of starch-sugar, made in one of the large factories out West. When first received, it was a white solid block rather beautiful to look at; the taste at first was sweet, but it left a rough and bitter taste in the mouth, on which account I called it apocalyptic sugar. (Rev. x, 10.) It was broken up and stored in a glass fruit-jar, where it became in a few months so covered with mold and so musty in smell that no one would eat it.

3. The artificial glucose or starch-sugar now manufactured in such quantities from Indian corn is liable to contain a considerable amount of foreign substances from the materials used in the process of manufacturing. These residuary materials are useless as food and sometimes cause sickness in persons eating the sugar or sirup. I have found sulphate of iron (copperas) and sulphate of lime (plaster) almost always present, and usually in considerable quantity; occasionally, but rarely, I have found free sulphuric acid. Two instances have come to my knowledge where a number of persons were made alarmingly sick by eating such sirup. In both cases the sirup was found to contain a considerable quantity of copperas.

ADULTERATION OF CANE SUGAR.

The large amount of starch-sugar which is now manufactured from Indian corn, and the enormous profits which would be secured by adulterating the costly cane-sugar by this cheap sugar have led many persons to suppose that all our sugars are now largely adulterated with starch-sugar. The suspicion is a natural one; and if the sophistication were easy to make and capable of complete concealment there is little doubt that it would be extensively practiced. But in the case of well-crystallized sugars it is difficult to practice such sophistication in such way as to avoid detection. Glucose obtained by evaporating its watery solution is not found in the form of crystals, but in white, opaque, granular, hemispherical, or cauliflower-shaped masses, which would at once distinguish it from the clearly-defined crystals of cane-sugar. Glucose can be obtained in the form of sharply-defined needle-shaped crystals from its solution in alcohol of 95 per cent., but "the game would not pay for the candle." The glucose could be dehydrated in a current of dry air at a temperature from 130° to 140° F., and then powdered and added to crystallized sugar, but it would then appear as floury dust in the sugar; the powdered glucose would be liable to absorb water from the air, forming a deliquescent mass, which would either make the sugar moist, or on again drying would agglutinate the sugar together in irregular lumps. The existence of clean, well defined, non-coherent crystals, free from floury dust, is good evidence of the absence of glucose from commercial sugars. I have analyzed a larger number of "granulated," "crushed," and "powdered" sugars without finding glucose in a single instance. Perhaps I have had a run of bad luck in looking for adulterations in this quarter, but I must confess to a complete failure in my hunt for glucose, tin-salts, lead-salts, terra alba, and all other adulterants in these sharply-crystallized sugars. Possibly my defeats have made me skeptical, but I am disposed to doubt the "common sophistication" of these sugars. Negative testimony can never become positive proof, and I would not be understood to say that such sophistication never takes place; I can only say I have never found them. In one instance I heard of a sugar in Lansing which I supposed to contain chloride of tin, from its turning from a white to a brown color (possibly from formation of "Maumene's caramelin"), but the sugar was returned to the wholesale dealer before I could obtain a specimen. In sugars not so distinctly crystalline, such as various grades of coffee-sugar, brown sugar, &c., adulteration by glucose is more feasible. In one specimen of "coffee C," I found 5.75 per cent. of glucose; in another 2 per cent.; in two others 1¼ per cent.; in "extra C" 1¼ per cent., and in "A" 1 per cent. This does not show very heavy adulteration. In the common candies where the crystalline form is purposely avoided as far as possible, glucose is often used in large quantities.

TABLE SIRUPS.

In table sirups of various names, "sugar-house drips," "golden drips," "silver drips," "rock-candy drips," &c., the substitution of glucose in place of cane-sugar is very general. In 1874 I made a report to the State board of health of Michigan, "concerning impurities and adulterations in table sirups," in which I showed that 15 out of 17 specimens of table sirup which I found in the market consisted mostly of glucose. I have lately made analyses of twenty-one specimens of table sirups, and find the following results, which express the percentage of glucose found in the total of sugar present, one hundred indicating that glucose is the only sugar present.

Commercial names.	Percentage of glucose in total sugar present.
	80
"Crystal drips"	22
	72
	100
	81
	95
	54
	39
"Golden drips"	98
	75
"Honey drips"	100
"Honey drips"	100
"Rock-candy drips"	88
	90
	87
"Silver drips"	100
(Pure cane, sugar!)	00
	75
	95
"White drips"	86
"Golden drips"	82

RELATIVE VALUE OF SIRUPS MADE FROM GLUCOSE AND CANE-SUGAR.

According to Storer's Dictionary of Solubilities, a saturated solution of glucose (at 15° C.) has a specific gravity of 1.206, and contains 44.96 per cent. of sugar, and 55.04 per cent. of water. A gallon of glucose sirup, therefore, would contain a trifle more than 4½ pounds of glucose.

A saturated solution of cane-sugar at the same temperature would have a specific gravity of 1.345, and would contain 66⅔ per cent. of sugar. A gallon of cane-sugar sirup would contain 7.17 pounds of sugar. If we adopt the estimate of Prout, that glucose has only two-fifths the sweetening property of sucrose, we come to the conclusion that one gallon of sirup made from cane-sugar has more sweetening power than four (4.17) gallons of glucose sirup. If sucrose sirup sells for 100 cents a gallon, glucose sirup should sell for 24 cents to represent the money-cost by an equivalent value in sweetness. It may be objected that this is an unfair mode of estimating the relative value of these sirups because the glucose has a food-value aside from its sweetness. I answer that the glucose sirups, cheap as they are, are an expensive form in which to purchase the carbohydrates for their mere food-value, because the sugar and starch in a bushel of corn are equivalent to the carbohydrates in nine gallons of glucose sirup.

HONEY.

At first sight we would naturally suppose that honey, that extract of a thousand flowers, would be pure, and safe from adulteration. Men felt that they could trust the honesty of the honey-bee, however much they might suspect that of her owner. But it is found that the bee is often made an instrument of unrighteousness. Not only is extracted honey largely adulterated with glucose sirup, but the honey in the comb frequently consists of little else than sirup of glucose. Enterprising parties at the East have been advertising a secret in honey-making by which a person may make a profit of from 300 to 500 per cent. If a person sends $5 for this secret he finds it essentially consists in directions to feed glucose in some form to the bees, which will store it up in the comb in large quantities. A person disgusted with all kinds of "drips" and every form of starch-sugar thus turns to comb-honey for a pure sweet only to meet his old foe in new armor. Honey is the concentrated nectar of flowers; the bee *gathers* but does not *make* honey. Recent experiments at this college show that when bees are only supplied with glucose or sucrose, and shut off from other sources of food, the honey they store up in the comb consists essentially of the sugar they have imbibed; they cannot to any great extent change sugar into honey.

This substitution of starch-sugar in place of honey is a shameless fraud, and imperils an important industry—bee-farming. A very promising foreign demand for honey will soon stop unless this fraud is prevented. Congress ought to pass a law to protect the bee-keepers and the honey-eaters. It may not have power to prevent persons feeding glucose to their bees, but it can compel them to label their honey for just what it is, or send them to prison for obtaining money under false pretenses if they sell such stuff for honey.

BAKING POWDERS.

Baking powders have only an incidental connection with food, yet they are so frequently used in place of the panary fermentation to vesiculate various articles of food, and have such a wide variation in quality, that I will briefly call attention to them. Most baking powders consist of cream tartar and bicarbonate of soda combined in equivalent proportions, with addition of a small amount of dehydrated starch to keep the materials sufficiently dry to prevent chemical action before they are used. The bicarbonate of soda as found in commerce is usually of good quality, but cream tartar varies greatly. One good property of cream tartar for such uses is that it dissolves somewhat slowly, and does not liberate the whole of the carbonic acid in one rush, leaving the dough to fall during the process of baking, but liberates the gas progressively, so as to leave a well-rounded loaf as the final result. If cream tartar and bicarbonate of soda could be obtained chemically pure, they should be combined in the proportions of 47 parts of cream tartar to 21 of bicarbonate of soda to form sodio-potassic tartrate, with liberation of carbonic acid; but as cream tartar usually contains at least five per cent. of neutral salts, good results may be obtained by combining 7 parts of best commercial cream tartar with three parts of bicarbonate of soda, and 1 part of starch dried at 230° F.

The value of commercial baking powders may be measured by the amount of gas which the same weight of powder will give off when placed in water. I have tested several kinds of baking powders which I have bought in the open market, by placing the same weight (10 grammes) in a flask with 250 cubic centimeters of water, and measuring the volume of gas given off in half an hour. The following table gives the commercial name of the baking powder and the number of cubic centimeters of gas given off:

1.	Price's Cream Baking Powder	350
2.	Royal Baking Powder	348
3.	Cook's Delight	335
4.	Condensed Baking Powder	320
5.	Horsford's	277
6.	Craig's	240
7.	Judd & Dewick's	220
8.	Dooley's	200
9.	Snow Flake	198
10.	Gillett's	196
11.	Baking powder (in bulk)	166
12.	Gates' No. 1	140
13.	Empress	104
14.	Peerless	90
15.	Cream tartar (7) bicarbonate of soda (3)	520

Cream tartar varies widely in quality and value, as is shown by the following results of analysis of representative specimens:

No. 1 contains 92 per cent. cream tartar.
No. 2 contains 88 per cent. cream tartar.
No. 3 contains 90¼ per cent. cream tartar.
No. 4 contains 21 per cent. cream tartar and 79 per cent. of sulphate of lime.
No. 5 contains 14 per cent. cream tartar and 86 per cent. of sulphate of lime.

Cream tartar which contains from 79 to 86 per cent. of plaster is a poor article indeed, yet I obtained these specimens from first-class grocers, who boasted of the excellence of their cream tartar, and honestly supposed they were selling a good article.

STATE AGRICULTURAL COLLEGE,
Lansing, Mich., December, 1879.

APPENDIX F.

REPORT ON DISEASES OF DOMESTIC ANIMALS.

BY JAMES LAW, *Professor of Veterinary Medicine in Cornell University.*

DR. J. L. CABELL:

SIR: In compliance with your request, I respectfully submit the accompanying statement as to how far in my opinion the functions of the National Board of Health must embrace a superintendence of the sanitary condition of the domestic animals. I have considered such animal diseases as determine specific and communicable disorders in man, and have sought to point out in what cases the gravity of the affection would demand the interference of a health board. A large number are mentioned over which a national board of health must exercise a careful supervision if they would fulfill their trust; and to enable them to accomplish this, Congress must give them power to add to their number men who have made a special study of animal diseases, and who are prepared to cope with them successfully. I have further sought to show how essential it is that a board so constituted should be invested with executive power, and not left as a mere advisory body, which must lose in intelligence, efficiency, and esteem in proportion as it is debarred from the practical work of overcoming insanitary conditions and of instituting experiments to determine the best methods of sanitation.

Finally, I have entered on the question of those affections of the domestic animals which are not communicable to man, but are transmissible from animal to animal so as to constitute veritable plagues and to undermine our agricultural prosperity. As agricultural success is the true basis of all national prosperity, the suppression and extinction of these animal plagues is a work only secondary in importance to the arrest of epidemics, as national wealth is only second to moral advancement.

Here arises the question whether a board of health already constituted to deal with a certain number of animal plagues is not the most economical and efficient medium through which to deal with all, and whether the whole subject of animal sanitation should not therefore be placed in the same hands. In seeking to take an impartial view of this matter I have taken into account the financial interests involved and the necessity for a representation of these interests in any organization appointed to deal with the subject. I have also considered the great expenditure necessary to a prompt extinction of the exotic animal plagues, and the need of an executive head who can act promptly in every emergency and without the fatal delays that would attend on calling meetings of a health board whose members reside at long distances from each other. Also, the vast importance of a speedy extinction of exotic plagues before they can gain a footing on the plains and boundless unfenced pasturages of the West and South, from which it would be hopeless to attempt their extermination. And, finally, the imperative need of prompt and effective work in order that the country may be made aware of the advantages of such an executive, and that there may be no excuse for a temporary—perhaps a final—abolition of the organization before they have had an opportunity to exterminate a single plague, and thereby to demonstrate their value to the nation.

In view of these and other considerations, an opinion is respectfully submitted, which is, at least, the result of no hurried conclusion, but of careful deliberation.

LIST OF COMMUNICABLE ANIMAL PLAGUES.

As the magnitude and gravity of this subject is but little appreciated, it will be best introduced by stating, in tabular form, the diseases of the domestic animals that are known to be communicable to man, and those which are intercommunicable between animals only. Afterward, the question will come up as to which of these diseases will demand the supervision of a health board, and under what circumstances.

A.—*Contagia common to man and animals.*

1. Glanders and farcy in horses, &c.
2. Canine madness, rabies in dogs, cats, &c.
3. Malignant anthrax in all domestic animals.
4. Tuberculosis in all animals.
5. Asiatic (malignant) cholera in all animals.
6. Milk-sickness in cows and other animals.
7. Small-pox in chickens, pigeons, &c.
8. Eczematous (aphthous) fever in bisulcates, &c.
9. Typhoid fever in sucking animals.
10. Diphtheria in animals.

B.—*Parasites common to man and animals.*

1. Echinococcus in animals; Tænia echinococcus in dog.
2. Cysticerus cellulosa in swine; Tænia solium in man.
3. C. medio-cannellata in calves; T. medio-cannellata in man.
4. C. tenuicollis in man, sheep, &c.; T. marginata in dog.
5. Tænia elliptica in man and cat.
6. Bothriocephalus latus in man, dog, &c.
7. B. cordatus in man, dog, &c.
8. Trichina spiralis in swine, &c.
9. Tricocephalus dispar in man and pig.
10. Strongylos gigas in man, horse, ox, and dog.
11. Ascaris mystax in cat and human being.
12. Fasciola hepatica in man, herbivora, and omnivora.
13. Distomum lanceolatum in man, herbivora, and omnivora.
14. Pentastoma tænioides in man, dog, sheep, &c.
15. Sarcoptis mutans in chicken and man.
16. Demodex folliculorum in dog, sheep, and man.
17. Æstrus bovis and other cuticolla in cattle and man.
18. Gregarina in man and animals.
19. Tricophyton tonsurans in man and animals. (Tinea tonsurans.)
20. Achorion schonleini in man and animals. (Tinea favosa.)
21. Microsporon adonini in man and animals. (Tinea decalvans.)
22. Oidium albicans in man and animals. (Thrush. muguet.)

C.—*Contagia communicable from one animal to another.*

1. Texas fever in cattle.
2. Swine plague. Intestinal fever of swine. Hog cholera.
3. Bovine lung plague. Contagious pleuro-pneumonia in cattle.
4. Rinderpest in cattle and other ruminants.
5. Sheep-pox. Variola ovina.
6. Swine-pox. V. suilla.
7. Cow-pox. Horse-pox.
8. Venereal disease of stallions. Dourine.
9. Foot-rot in sheep.
10. Strangles in horses.
11. Influenza in animals.
12. Infectious mammitis in cows.
13. Parturition fever in ewes.
14. Quebra bunda in horses.
15. Horse sickness of South Africa.

D.—*Parasites causing enzootics in animals.*

1. Scabies acariasis.
   - In sheep
     - Follicular scabies. Demodex folliculorum.
     - Scab.
       - Dermatocoptis ovis.
       - Dermatophagus ovis.
     - Black nose. Sarcoptis ovis. (Leptus Americani ?)
   - In horse
     - Mange.
       - Sarcoptis equi.
       - Dermatocoptis equi.
     - Poultry mange. Dermanyssus avium, &c.
     - Foot mange. Dermatophagus equi.
   - In ox
     - Mange. Dermatocoptis bovis.
     - Foot mange. Dermatophagus bovis.
     - Poultry mange. Dermanyssus avium, &c.
   - In pigs and dogs, mange. Sarcoptis suis (Squamiferous).
   - In dog
     - Mange. Sarcoptis squamiferous (Suis).
     - Follicular mange. Demodex folliculorum.
   - In cat and rabbit, mange. Sarcoptis nivar.
   - In chicken, scabies
     - Sarcoptis mutans.
     - Dermanyssus avium.
2. Lung worms.
   - In sheep, goat, and camel
     - Strongylus filaria.
     - Strongylus filaria, varietas longus.
     - Strongylus Africana.
   - In horse and ox, Strongylus micrurus.
   - In swine, Strongylus elongatus.

In birds, gapes. Sclerostomum syngamus.
3. Sclerostomum hypostomum in sheep.
4. Strongylus filicollis in sheep.
5. Strongylus contortus in sheep and cattle.
6. Sclerostomum equinum in horse.
7. S. tetracanthum in horse.
8. S. suis in swine.
9. Tricocephalus affinis in cattle and sheep.
10. Stephanurus dentata in swine.
11. Echinorynchus gigas in swine, cockroach, ladybug, &c.
12. Ascaris suilla in swine.
13. Tænia expansa in sheep and cattle.
14. Cœnurus cerebralis in sheep, cattle, dogs, &c.
15. Œstrus ovis, grub in the head, in sheep.

In presenting this formidable list of diseases it must not be supposed that we advocate an immediate resort to suppression of the whole. A very few only will demand prompt and active suppression. For others, even of the most dangerous character, there is only wanted a guardiancy over trade to prevent the importation of disease or its extension into regions where it would be seriously detrimental. While for most places it will be at long intervals only and in special conditions that the resulting disease will arise to the dignity of an epizootic or epidemic and demand executive interference, yet there are few maladies mentioned above that may not and do not in particular circumstances attain to such dimensions, and a national board of health, charged with the supervision of the sanitary condition of animals as well as men, must be prepared to meet and successfully deal with any one of the above affections to which the human being is subject. Similarly, must an organization, formed to deal with the plagues peculiar to animals, be prepared to deal with any one of those affections when it attains to dangerous proportions.

GLANDERS AND FARCY.

This affection, which so remorselessly ravaged the cavalry regiments and mule trains during the recent American war, was, at the return of peace, scattered widely over the continent. In country districts we continually see it cropping out, and whole studs falling victims to its ravages, while in city car-stables hundreds are not unfrequently slaughtered to arrest the progress of the scourge.

The subjects of the slight and chronic attacks are frequently taken to a distance and sold as sound animals to unsuspecting purchasers, whose health and lives are thus too often sacrificed to satisfy the cupidity of an unscrupulous vender; for this terrible malady is as painful, loathsome, and fatal to the human system as to the equine, and every veterinarian of extensive practice can adduce instances in which men have perished miserably from the equine infection.

Were it only for the money losses inflicted by this scourge, it would demand the prompt destruction and safe disposal of every infected animal.

At the beginning of the present century, horses suffering from chronic glanders were habitually kept and worked in Great Britain, and the losses throughout the island were enormous. Now, where it is illegal to keep a glandered horse, these have been reduced to a very limited number. In the English army, where the presentation of symptoms equivocating glanders entails the prompt slaughter of the subject, this disease has been definitely eradicated, and a former loss of ten per cent. per annum has been entirely obviated. When we add to this the moral and economic considerations of the preservation of human health and life, the demand for the instant destruction of animals afflicted with this disease becomes imperative. A statute looking to this end is demanded in all States in which it has not been already enacted, and it becomes the duty of the National Board of Health not only to urge the passage of such a protective law, but to see that it is properly administered. That such a supervision is necessary may be inferred from the facts: 1st. That many of the most dangerous forms of glanders show deposits only in the lungs, testicles, or other distant and deep-seated organs, and these would escape the detection of an ordinary observer, or, indeed, of any one excepting a thorough and accomplished veterinarian, and the subjects of such deposits would be preserved for months or years to spread the disease; 2d. That to extirpate the disease when it has broken out in a stud or locality, it is not enough to dispose of the infected beasts and to thoroughly cleanse and disinfect the premises and movable objects, but this must be followed when requisite by an improvement of the hygienic conditions of the stud, and especially in the matters of ventilation, work, and alimentation. In the case of a disease like glanders, so fatal to both man and horse, the infected horse should be slaughtered as would a venomous reptile, without any consideration of indemnity. The laws under which the destruction is effected should, if possible, be State and municipal, so as to make their administration the especial duty of the local magistrates, but it should be made incumbent on all good citizens to notify such authorities in all suspicious cases, and in case of uncertainty as to the true nature of the disease or indisposition to administer the law, the National Board of Health should be the court of appeal empowered to institute an examination and to see that the law is enforced.

CANINE MADNESS, RABIES, HYDROPHOBIA.

In canine madness we confront a disease which even more than glanders demands restrictive measures. The glandered horse is dangerous mainly to those who voluntarily approach him, and he shows no mischievous propensity to inoculate other animals or man with his dreadful infection. But the rabid dog seems as if the impersonation of all evil. Himself suffering from one of the most excruciating and hopeless of diseases, he seeks to fasten his venomous fangs in the flesh of every living creature as if he took a malignant pleasure in inflicting his own agonies on all within his reach. Nor is this peculiarity confined to the rabid dog. All animals that naturally use their teeth as weapons of offense when attacked by the violent type of rabies are seized with a similar uncontrollable desire to bite; and as the saliva of the sick is alike virulent in all genera, the danger of the propagation of the malady in this way is very great. The losses from rabies among men and farm animals run far higher than is generally supposed, and are confined to no season, the popular prejudice against the *dog-days* to the contrary notwithstanding. In seeking to reduce these or obviate them altogether much is to be done in the way of—first, regulating the keeping of dogs; second, in advice for the private management of dogs by their owners; third, in protection against the free importation of dogs from countries in which rabies abounds; fourth, in acquainting the general public as to the early symptoms of rabies; fifth, in the destruction of all rabid dogs and of all exposed animals that naturally use their teeth as weapons of offense; and, sixth, in the supervision and frequent examination of exposed animals of genera that do not use the teeth, for a sufficient length of time to insure that no form of the disease, either of a violent or occult type, shall be developed. The destruction of the rabid animal may safely be left to people in the locality, but further precautions would demand the interference of a board of health; hence all cases of rabies should be reported to it, that suitable protective measures may be taken.

MALIGNANT ANTHRAX IN ALL DOMESTIC ANIMALS, AND MALIGNANT PUSTULE AND INTESTINAL ANTHRAX (MYCOSIS) IN MAN.

In all the protean forms of malignant anthrax in animals, we find an infecting material which is not only deadly to quadrupeds, birds, and even reptiles and fishes, but which may be successfully inoculated from any one of these upon the human subject. The malady when conveyed to the human being is a very deadly one, whether it shows itself on the surface in the form of malignant pustule (Siberian boil plague), or internally, as *carbuncular sore throat* or *intestinal anthrax*. In this country it prevails mostly among butchers, tanners, and workers in hair, but is also well known as the result of consuming the flesh of infected animals. Infection from simple contact is by no means uncommon. Quite recently I saw an outbreak in which 100 cattle and three men suffered. In a second, 12 cattle and 2 men. In a third, a cat conveyed the malady to a young lady who nursed it. Where the disease becomes widespread, the resulting human mortality may be excessive, as when in 1770, 15,000 men died in six weeks, in San Domingo, from eating the diseased beef. Cooking is a very insufficient protection, as the resting spores have been shown to survive a boiling temperature, and, in particular cases, even 300 Fah., and a whole family were poisoned in Aberdeen, Scotland, by the beef that had been boiled for hours in broth. Further, and contrary to what holds with most other forms of virus, it is not essential that the skin should be broken in order to its absorption, and numerous instances can be adduced in which fatal results followed when it was deposited on the sound skin. Frost has no influence on its potency, and I have known a number of animals fatally infected by licking the frozen blood from a stoneboat, when the temperature was below zero. Nor is time nor putrefaction to be relied on. I have known cattle to perish promptly after lapping the liquids that leached from a grave in which an infected carcass had been buried nearly a year before. I have further known pastures, on which the disease had been developed for the first time in the memory of the inhabitants, maintain their infecting qualities for six years in succession, and to yield hay which continued to infect animals when fed to them at a distance from such pastures.

Being enthetic rather than infectious, this malady fortunately rarely attains to the dimensions of a plague, and rarely extends very widely from its true sources of origin. These are mostly in damp lands with a soil rich in decomposing organic matters, and especially such as have an impervious subsoil, or which, by reason of the basin-like conformation of the locality, has no sufficient drainage. Rich river-bottoms and drying-up marshes, ponds, and lakes, lands that have been overmanured, and those supplied by drinking-water collected from the surface or from strata rich in organic remains, are especially likely to be centers for the reception and preservation of this poison. In such localities, those animals are especially liable to contract the disease which are already in a somewhat morbid condition, excessively plethoric, having the blood charged with hurtful elements, the result of disease, faulty diet, or imperfect elimination, that have had secretions retained or fever developed in connection with hot dry seasons, lack of water, gastric and intestinal impactions, hot close buildings, isolation or excessive alternations of midday heat or midnight cold, and finally those in which from rapid growth or assimilation the tissues are soft, lax, and watery. With such animals, and in such localities, the disease is very liable to appear, and to continue to appear with increasing frequency and fatality, so that such places come to be known as "*dead lots*," and are avoided by all judicious stock-owners. The malady is always confined to limited districts, unless where the above-named conditions extend over a wide territory, as in the rich alluvial steppes of Eastern Europe and Asia, in the plains of India, and in certain of our own rich river bottoms and prairies. It deserves to be stated that, like malarious fevers in man, this affection has become increasingly frequent throughout most of the United States in the past few years. While there is a strong probability that the disease is due to a microphyte—bacillus anthracis—which is found in the blood in all the worst cases, and that certain conditions of the animal system are necessary to cause it to branch out into its special pathogenic development, yet, when its virulence has once been acquired it maintains this through an indefinite number of generations of the virus, and proves one of the most indestructible of known contagia.

Like glanders and rabies, therefore, this disease will demand a careful control by a National Board of Health, and measures must be resorted to for limiting its area and extirpating it wherever it threatens to attain to a dangerous prevalence.

TUBERCULOSIS IN ANIMALS AND MAN.

It is only since the inoculation experiments of Villemin that the dangers resulting from tuberculous animals have been at all appreciated. To-day, after ten years of experimental observations by Villemin, Viscar, Klebs, Zurn, Bollinger, Leisering, Chauveau, Bagg, Semmer, Guenther, Harms, Biffi, Virgad, Gerlach, Buhl, Tilbury, Fox, Burden Sanderson, and a host of others, it has been definitely established, 1st, that tuberculosis can be transmitted from animal to animal, from man to animals, and presumably from animals to man, by inoculation, or by the accidental contact of tuberculous matter with a raw or abraded surface; 2d, that raw tuberculous matter taken from man and animals and eaten by other animals may determine tuberculosis in the latter; 3d, that even the flesh of tuberculous animals will sometimes produce tuberculosis in animals that consume it, though with less certainty than if the tubercle itself were taken; 4th, that the milk of tuberculous animals will at times produce tuberculosis in susceptible subjects, and above all where the morbid deposit has taken place in the udder; 5th, that cooking of the tuberculous matter gives no guarantee of protection, as flesh is a poor conductor of heat, and tubercle that had been boiled from a quarter to half an hour has readily infected a number of animals that partook of it; 6th, that tuberculous matter mixed with water and thrown into the air from an atomizer causes with great regularity the development of tubercles in the lungs of animals respiring such air. The above conclusions will admit of some qualifications. It may be admitted, for example, that the consumption of the flesh and milk of tuberculous animals is often followed by no perceptible injury. Phthisical cows are often eaten without causing obvious disease in the consumers. I have known large dairies of tuberculous cows, in the hands of vigorous and healthy-looking owners, who consumed the milk freely. I have kept two rabbits consuming *all* the milk of a tuberculous cow for months, and until the latter died, without developing any signs of tuberculosis in the rabbits. I have kept other rabbits for two months on the milk of a cow suffering from acute tuberculosis without any appreciable evil result. It may be freely concluded that a large number of individuals while in the enjoyment of robust health will withstand the influence of tubercle taken in by the stomach, but it must be otherwise with the weak and young, those with poor feeding and worse air, those living in damp sunless localities, and subjected to much exposure. In a case that recently came under my notice in Brooklyn, N. Y., a family cow was found in an advanced state of tuberculosis, and the owner (William Martin) and his wife were evidently rapidly sinking under the same malady. In another case reported to me by Dr. Corlies, of New Jersey, a family cow supposed to be suffering from the lung plague was found to be afflicted with tuberculosis instead, and the owner's wife (a consumptive), who had been making free use of the milk warm from the cow, was persuaded to give it up, and underwent an immediate and decided improvement. It is for infants and adults who are somewhat infirm or out of health, or whose surroundings are not of the most salubrious kind, that the danger is greatest, but this embraces such an extended class that the moral interests involved are almost illimitable. The destruction of infancy and wasting of manhood from this cause is unquestionably far greater than has been heretofore realized; and on the moral ground alone this subject demands the watchful attention of a board of health. But even as a financial question, and as estimated by the losses in live stock alone, the subject attains to wide proportions. The infection of tubercle once introduced will often extend from the single diseased animal to a whole herd with startling rapidity. Last winter I visited a heard of sixty Devon cattle that were reported as perfectly sound six years ago. At that time a bull was bought which proved tuberculous, and the disease had steadily increased until at the time of my visit there was not a sound animal on the premises. Into a second herd nine poor calves were introduced in the fall of 1878. They were afflicted with a cough, which soon attacked the five other calves on the place, the eight cows, and two cows of a neighbor that pastured with them. At the time of my visit in the spring of 1879 all showed distinct symptoms of tuberculosis.

These may be thought to be extreme cases, but I am acquainted with districts in which 30 per cent. of the cattle suffer from tuberculosis, and with many high-priced herds in which this scourge yearly claims its victims. In his experiments Professor Gerlach had to utterly discard certain strains of high-bred swine, because of the astonishing frequency of tuberculosis in these subjects.

This disease opens up an extensive field for sanitary work, and particularly in the neighborhood of large cities, where so many infants, subjected to all the depressing influences of city life, are sustained by the milk of cows kept in unwholesome stables and fed so as to secure the greatest possible yield of milk, irrespective of results. Here the environment of the cows that yield the milk, and that of the children who consume it, are altogether favorable to the propagation of tubercle, and the subject requires the most careful supervision of the sanitary authorities.

The great mass of the adult city population is only a degree better in this respect than the infants; and as the cattle that are no longer useful for milk are too often made into beef, or rather sausages, the children of a larger growth are confronted with the risk of tuberculous meat as well as infected milk. The same dangers attend on the country districts, and though they are to some extent counteracted by pure air and better surroundings, yet the taint, if once introduced into a herd, tends to undergo a steady increase, until, as in the case of the country herds I have referred to above, all fall under its baleful influence. Then, again, in most of our large cities the cows are not kept over one season, but are constantly being replaced by fresh ones from the country; and it is only by purifying the source of the trade that we can secure sound cows in the cities.

That a supervision and restriction of tuberculosis is demanded cannot for a moment be gainsaid; but in view of the enormous proportions of such a work, and the great monetary interests involved, together with the recent data of all exact observations on the transmissibility of the contagion and the different results obtained in different cases, it would be well, before proceeding far in this matter, to conduct a series of experiments which would tend to determine more accurately the conditions in which the different products are virulent and the circumstances in which exposed animals are susceptible. The proper supervision of this affection will demand the most careful consideration of the soundest and most enlightened minds. It would demand—first, the enforcement of a series of sanitary rules for the construction and management of city and suburban cow-stables, embracing the sites, exposure, drainage, space per animal, ventilation, water supply, food, cleanliness, &c.; second, a professional inspection of the cow-stables to insure that no cow with active tuberculosis is kept for the supply of milk, and no bull for the propagation of his kind; third, a professional inspection of the slaughter-houses and poulterers' to see that no flesh nor other products from dangerously tuberculous animals are allowed to pass into consumption as human food. As far as possible a sanitary control should be established over country herds as well, and means should be taken to extirpate the disease and remove its causes in the many districts in which the affection has become domiciled as an enzootic.

MALIGNANT (ASIATIC) CHOLERA.

With the threatened approach of a new visitation of cholera the National Board of Health must apply to the lower animals all those precautions which have proved beneficial in warding off this scourge from the human race. In this connection it need only be stated that Annesley, Jamieson, and many other Indian physicians testify that during cholera epidemics the domestic quadrupeds often showed a greater mortality than man, and that poultry-yards were utterly depopulated by the scourge; that Hildebrandt, Hering, Dick, Reynal, and others record the ravages of this plague simultaneously in man and animals in Europe; and that Burden Sanderson and others have produced the disease experimentally in the rodents by feeding paper dipped in the virulent alvine discharges of men. It has often been noticed that birds disappear during cholera epidemics, the rational explanation being that they perish. This will especially demand the careful seclusion of all animals in cholera districts; the destruction, if necessary, of wild animals; the disinfection of all bowel dejections and of the carcasses of animals dying of the plague, as well as of the places and loose objects where the sick have been; and, lastly, the most careful attention to prevent further infection through fodder, litter, or other solids, and through surface or underground drainage, natural or artificial, into wells or streams, into contact with the food of men or animals or the places where animals resort to lick the soil. It is evident that no system of protection can be effective that fails to recognize that the lower animals transmit this virus as well as suffer its consequences.

MILK SICKNESS. THE TREMBLES.

The great importance of this disease has failed to be recognized, mainly because its source is to be found in certain backwoods districts rarely penetrated by those who preside over our medical literature, and because it gradually recedes before the advance of improved agriculture. Many medical men indeed express grave doubts as to its very existence. Yet the history of the malady is so circumstantial and clear that a doubt as to its specific nature is eminently disingenuous. In its source in unimproved marshy localities it closely resembles the malignant anthrax, also in its communicability to all animals, but it differs essentially in that it fails to show local anthrax lesions, in place of which it expends its energy on the nerve centers, producing great hebetude and loss of muscular power. According to Dr. Phillips, it is characterized by the presence in the blood of a microzym (spirillum), like that seen in relapsing fever. The germ is probably derived from the drinking-water or the surfaces of vegetables, as certain wells are found to infect with certainty, and the disease has been repeatedly produced by feeding upon particular plants (Rhus toxicodendron, &c). That these plants in themselves are not the pathogenic elements, is shown by their innocuous properties when grown in places out of the region of the milk-sickness infection. It seems altogether probable that here, as in malignant anthrax, we are dealing with a microzym which has developed pathogenic properties and which can be reproduced indefinitely in the bodies of living animals. The great danger of this affection consists in the conveyance of the germ with unimpaired potency through the flesh and milk and through the manufactured products of the latter—butter and cheese. Some even hold that in animals giving milk the system does not suffer materially, but that it is saved by the drainage of the germs through the mammary glands, and that thus a milk-sick cow may remain for a considerable time unsuspected, while her milk, butter, and cheese are conveying mental and physical decay and death to many human beings, near and remote. For the disorder proves as fatal in man as in animals, and if in particular cases it fails to destroy life, it usually leaves the subject in a condition of hebetude and physical weakness that makes life miserable.

The permanence of the germ in butter and cheese renders inevitable the conclusion of physicians in milk-sick districts, that cases of this disease must be frequent in city populations, but that its true nature is not recognized by the medical attendants. The whole subject demands a thorough experimental investigation at the hands of the National Board of Health, so that the true source and germ of the malady may be discovered, if possible, and that in any case intelligent measures may be taken to prevent its conveyance out of its native habitat.

SMALL-POX IN BIRDS.

In Europe and Hindostan variola is so common in pigeons and poultry as to constitute a veritable plague. Thus Guersent records that out of a dovecote of 1,000 scarce 100 could be found that did not bear marks of the disease, while Tytler says the poultry-yards in India were habitually depopulated by the plague. Bechstein and others claim that this is the true small-pox derived from the human being and conveyable back to man, while others, like Toggia and Gilbert, assert that it is communicable to the sheep. That this affection has not been recognized among us may be due to a difference in the environment which modifies the infection, or, perhaps, to the fact that men and pigeons do not live so much in common here as in Italy and India. Such an occurrence under Italian skies should, however, demand a careful investigation into the reality of such infection in our own States, and especially the Southern ones, during the prevalence of an epidemic of small-pox, so that whatever danger arises from this source may be detected and guarded against.

ECZEMATOUS (APHTHOUS) FEVER IN ANIMALS.

Although this disease is communicable to man in a mild form, and to infants who live on the fresh milk in the form of a violent and even fatal inflammation, yet, as it has at present no foothold on this continent, and, like rinderpest, sheep-pox, dourine, quebra bunda, &c., may be easily excluded by inspection and quarantine at our ports, it will be best to leave it with the purely animal plagues to the control of a veterinary sanitary bureau, and thus avoid the multiplying of inspectors.

TYPHOID FEVER IN SUCKING CALVES.

Reports have lately been published of the occurrence of this disease in calves, and of the infection of a number of persons that have eaten of the veal; it seems very desirable, therefore, that experiments should be instituted to ascertain whether animals kept on an exclusively milk diet are susceptible to this infection of man. It seems altogether probable that a mistake has been made and that the calves and their victims died of trichiniasis, intestinal anthrax, or of some other poison common to man and animals; but it should at least be shown by the National Health Board that the danger of the alleged transmission of typhoid fever is altogether fanciful.

TRICHINIASIS.

The life-history of the trichina spiralis is now fairly understood. The parasite is harbored by very many mammalia and probably even by reptiles, but is, above all, common in rats, pigs, and men. It has its two principal stages of existence—the *sexually mature* form, which lives and propagates its kind in the intestines only, and the *immature asexual* form, which, born in the intestines, bores its way through their walls and into the voluntary muscles, where it encysts itself. These last attain maturity only when their host is devoured by a carnivorous animal, and when the cyst is digested off so as to set the imprisoned trichina free. A third habitat may be named for those embryos that have been carried out of the system by the prevailing diarrhea ere they have had time to penetrate the intestinal walls and seek an asylum in the solid tissues. These can live for an indefinite length of time in pools of water without undergoing further development, until they are taken in by a mammalian host, when they penetrate the intestinal walls and encyst themselves in the muscles.

All this has been known for many years, but sanitation has advanced no further than to advise the microscopical examination of all pork, to enjoin that it be thoroughly smoked or well cooked before it is eaten, and to utter a warning against keeping pigs about slaughter-houses and feeding them on the raw waste products. Meanwhile, our pork hams have been, rightly or wrongly, acquiring a most undesirable reputation. Dr. Belfield and Mr. Atwood, of Chicago, pronounce 8 per cent. of the hogs killed in that city to be trichinous, and several European countries have forbidden the importation of American hams. In Germany, on the other hand, where all pork is subjected to microscopic examination, the statistics show that trichina have been found in but one of 2,000 hogs examined.

The protection of our population against this tremendous scourge, and of our market against the embargoes of frightened Europeans, demands a system which shall reach further and prove more thorough. The feeding of pigs on any flesh that is not thoroughly cooked should be strictly prohibited, a trichina inspector should be made to examine all pork exposed for sale, in our cities especially, and any discovery of trichinous pork, whether from such inspections or from the occurrence of the disease in man, should lead to such inquiries as would in all possible cases discover the source of such pork, and then should follow the destruction and prolonged boiling of all hogs, dogs, cats, rats, mice, snakes, and other carnivorous animals on the premises, the burning of the hog-pens and manure and the closure of the yards against hogs for one year; also, the shutting up of all wells or other collections of water to which the swine may have had access or into which drainage from the pens could have taken place.

Further, examination should be made in such localities of all animals, vertebrate and invertebrate, that the hogs could be expected to have devoured. Under such a system not only may we hope for a material decrease of trichinous hams and bacon, but for valuable discoveries of hitherto unsuspected and dangerous hosts of parasites, so that the work of extermination would continually become more easy and effectual.

ECHINOCOCCUS.

In all countries where it abounds (Iceland) this is one of the most destructive of the parasites of man. In the United States it is by no means so common as to give rise to much apprehension, and yet an examination of the internal organs of animals slaughtered, and a consultation of medical records, show that it is far from uncommon. As the parasite is derived from the dog, and as its tænia form in the bowels of that animal is so small as to be rarely recognized, it is likely to cause great damage before its presence is suspected in a locality. This is but one of a myriad of heavy charges that must be brought against the crowds of useless curs that everywhere abound, and more or less directly impair the health and prosperity of the people. With man alone the dog reciprocates in sustaining no less than seven dangerous animal parasites, in addition to the vegetable ones, producing the different forms of ringworm; with cattle and sheep he joins in maintaining three that devastate our herds and flocks. His ubiquity is a continual threat of canine madness to all living things. He has remanded to nature, or to less productive culture, large tracts that are admirably adapted to the raising of sheep, but where the losses from the devouring jaws of the dog have rendered sheep farming unprofitable. Sanitary considerations, alike affecting man and beast, therefore demand a rigid control of dogs and the imposition of a tax that shall be to a large extent prohibitory of their maintenance. Further, whenever echinococcus, cysticercus tenuicollis, Bothriocephalus latus, B. cordatus, Strongylus gigas, Pentastoma tænioides, or Demodex folliculorum occur in man, attention should be given to the condition of the dogs in the locality, and measures taken to prevent the propagation of these parasites through their systems.

OTHER PARASITES.

To go over the other parasites which are common to man and animals would serve no good purpose. They rarely attain to the gravity of an epidemic, and will only demand sanitary interference in very exceptional circumstances; yet the board of health must be so constituted that it can effectually deal with any of these in such an emergency. For this, a veterinary sanitary committee will be always prepared, and will act mainly as an advisory body; but also, when necessary, in an executive capacity. Thus, an influx of measly pork should demand that it be traced to its source, and that its source, the tapeworm of man (T. solium), should be destroyed, while all pigs should be forbidden the infected ground for over a year. An influx of measly veal should demand a similar correction, and thus dangers of a material increase of either of these parasites will be done away with. In fishing localities where the Bothriocephalus latus or B. cordatus gains a wide diffusion it may become necessary to keep all dogs under the closest surveillance and to periodically rid them of the parasite. It might further become needful to control the consumption of certain fish, or of fish-eating mammals likely to be devoured by dogs. The prevalence of Sarcoptis mutans (scabies) in chickens may become so great that it will entail a most inveterate itch in man, the true source of which is seldom discovered. Again, gregarina have lately been found in the lungs of chickens, and in the bowels of pigs, and it seems quite within the bounds of probability that as they live on the hairs of man, so they may at times infest his internal organs.

For the above reasons it is desirable that Congress should provide or the incorporation with the National Board of Health of one or more veterinarians, whose functions it would be to consult with the present members in all matters in which the health of the lower animals affects that of man; to advise as to the enactment and administration of State laws for the prevention and extinction of plagues and parasites common to man and animals; to conduct experimental researches into the source, propagation, and extinction of these disorders and parasites of animals, and to act when necessary in an executive capacity in the exclusion or control of these scourges. To carry out these objects, Congress should be asked to appropriate a sum of money, to be expended, as may be seen to be best, in experiments, in investigations, and in the control of these epidemics and epizootics.

Plagues and parasites peculiar to the lower animals.

In turning now to the communicable disorders of the lower animals to which man shows no susceptibility, we face a much more extended class. No less than thirteen different forms of contagia and thirty-four different parasites exist, any of which may induce a prevalence that rises to the dignity of a plague. Among the contagia given in our list the majority are probably indigenous to our soil, while four are certainly exotic. Of the latter but one (lung plague of cattle) is known to exist at present in the United States, but that one more imperatively demands instant and effective action than all our plagues of home birth. Arising in this country from contagion only and having an excessive incubation period (one to three months) it can be spread with the greatest facility by animals that carry the seeds of the malady but have not yet developed the disease. Having a constant tendency to the death of tissue and to the encystment of this as a mass (infecting material), which remains unchanged for many months in the chests of animals that are thought to have recovered, it is ever liable to be spread by the apparently convalescent. Add to this that this contagion, if once carried to our Western and Southern stock-ranges, could never be eradicated, but must remain as a permanent incubus and scourge as it has on the Steppes of Russia, the open lands of Australia, and the unfenced ranges of Southern Africa, and we see reason why a prompt attention should be given to its speedy extermination. If more is wanted to enforce this, it is the calculation (based on the European losses from this plague and the steady increase of our own herds of cattle) that this pestilence, left to itself and extended to our Western stock-ranges, will probably lay us under a tax of $130,000,000 per annum. But the flesh of animals attacked with this plague has never been shown to be injurious to man, and thus the question of its extinction is an exclusively pecuniary one and demands the action of the stock-owner rather than the sanitarian. While the necessary steps to insure the extinction of this and allied plagues are sufficiently well known to the veterinary profession, and while effectiveness and promptitude are best secured by placing the matter in the hands of one executive head, yet it will better command the confidence of the stock-owners and indirectly of Congress if one or two representative stockmen are officially connected with the work.

While on purely professional matters the veterinarian must of course decide, and in the execution of the work which is essentially professional he should direct, yet in many subjects connected with cattle-raising and the peculiarities of the trade in different parts of the country the knowledge and experience of the stockman will be of inestimable advantage in arriving at safe and effective local enactments that will not unnecessarily harass or hamper trade on the one hand nor be easily evaded on the other. A small committee or bureau of this kind, clothed with executive authority and with financial means equivalent to the end, could make much more effective work than could a committee of the board of health, who could not be got together to meet every emergency. Again, the first part of this sanitary work must be done as speedily as possible because of the great and increasing dangers that attend upon delay, and to secure this it will be necessary to appropriate a large sum of money to enable the executive to carry it on with uninterrupted energy to the end, since any suspension for lack of funds would entail the renewed spread of the disease and the loss of all that had been already expended. This consideration is a vital one, and of itself would decide me in favor of a separate executive for the exclusively animal plagues, to be furnished with abundant means and full administrative power. A supplementary appropriation to the board of health, which might be largely used up for what at the moment and as viewed from a moral standpoint might appear as a more urgent demand, would be hurtful to both human and veterinary sanitation. If, for example, the work of exterminating the cattle lung plague had to be entirely arrested for want of means, it would soon again extend over the ground which it had lost, all that had been expended on it would be forfeited, and there would be less likelihood of a speedy resumption of the work. If even the work were only retarded for lack of means, as has been the case in New York for the past three months, if the executive could only quarantine infected herds and partially control the movement of cattle, but could not kill the sick for want of means to indemnify the owners for their losses, a most hurtful blow would be dealt to the entire system of national sanitary legislation and administration. In either case the most prominent fact before Congress and the people would be that so many hundred thousand dollars had been expended for the extinction of a plague which, when the next appropriation was requested, either prevailed as widely as at first or was only appreciably less prevalent. All representations that the want of success had been due to the lack of means would receive little attention; the community would conclude it better to squander no more money on the matter; all further veterinary sanitary legislation would probably be rendered hopeless; no small amount of opprobrium would be thrown on the National Board of Health itself, and a severe blow would be dealt to all national health legislation.

It is especially fortunate that, by reason of the active measures carried out in the first six months of our work in New York, we can now point to seven counties virtually cleared of the pestilence, and by later restricting our work to controlling movement of cattle, we have been able to prevent any renewed extension of the pest; yet with a little more means New York might have been to-day all but clear of this scourge.

The time may come when the nation will be sufficiently educated to allow the sanitation of man and animals to be controlled by a single national health board; but at present, and for the exclusively animal plagues, we cannot afford to run any risks, and that method should be followed which will secure a certain and speedy result, and establish the principle of the extinction of such pestilences on a sound and unassailable basis. I would therefore urge as the result of mature deliberation, in view of all aspects of the question, that the control of those animal contagia and parasites which affect man as well should be placed in the hands of a veterinary committee of the National Board of Health organized for this purpose, while the exclusively animal plagues and the parasites that affect animals only should be committed to an organization drawn from the stock-owners and the veterinary profession, and not too large or unwieldy for the most prompt and effective action.

I consider it needless to encumber this statement by any further reference to the other animal plagues and parasites, as I would not recommend *immediate* executive action for more than one other in addition to the bovine lung plague. Besides this, the work of the special veterinary organization would consist mainly in controlling the imports of live stock and in advising as to the management of local epizootics which did not immediately threaten the nation at large.

APPENDIX F.

WASHINGTON, D. C., *January*, 1880.

SIR: In compliance with your request that I should examine into the diseases of animals, and particulary as to the relation these diseases bear to the health of man and to the wealth of the nation, I have the honor to submit the following:

CATTLE DISEASE IN RELATION TO THE HEALTH OF MAN AND IN POLITICAL ECONOMY.

The death of a great number of cattle from contagious and infectious diseases is a question of national importance, one that should be studied from *three* points of view, viz:

First. Whether these diseases in the cattle while living, and the results of said diseases in the meat which man consumes, affect the health and life of man.

Second. Whether such a loss may not entail great injury and inconvenience to the industry as well as to the wealth of the nation.

To settle these questions we must first inquire, "Are there preventible diseases which contaminate largely our cattle?" To this we may answer, "Yes."

Statistics, especially as to the diseases of cattle, are exceedingly scarce and quite unreliable in this country, yet we learn from many indisputable sources that fatal, contagious, and infectious diseases prevail to an alarming extent among our food-producing animals and among the domestic animals that assist man in his labor.

It is an actual fact that many thousand horses, oxen, cows, sheep, and hogs annually die from diseases that are preventable. This loss is sufficient to entail upon the government's revenues a great decrease, and a great increase upon the cost of food. Such diseases as the Texan fever, pleuro-pneumonia, milk sickness, malignant anthrax, glanders, hog cholera, typhoid fever, sheep-rot, &c., carry destruction in our stock-yards and stock-farms.

As the rinderpest descends from the Steppes of Russia, to carry death to the animals of Germany, Holland, Belgium, France, Italy, England, &c., to the great dismay of these nations, so the Texan fever, from the Rio Grande to New York, stamps every foot of the soil with a poison which carries destruction to our cattle.

The nations of Europe, anticipating actual famine from the death-dealing rinderpest, sought to interpose such a check upon the dissemination of this malady as would protect them from the loss of their cattle. This they did by instituting proper scientific investigations and enacting laws that the occasion required. What has been done in this country against the ravages of the Texan fever? Well-nigh nothing.

A spasmodic investigation into the "Diseases of cattle in the United States" was ordered by Congress in 1870 to be carried on under the direction of the Commissioner of Agriculture. This resulted in an able report of the valuable researches of Professor Gamgee, Dr. J. J. Woodward, Drs. Billings and Curtis, and of Messrs. H. W. Haven and J. R. Dodge; but beyond the ordering of six thousand copies of this report for distribution, I am not aware that anything was done to prevent the diseases. I will refer to this report hereafter. Within the last year or two the Commissioner of Agriculture has instituted further investigations, the results of which are brought forth in another report, dated September, 1879, from which we learn the immense loss of animals this country annually sustains from preventable diseases.

The States of New York, Massachusetts, Illinois, Indiana, and New Hampshire made investigations and enacted laws, rules, and regulations for the protection of the cattle under their respective jurisdictions, and against the importation of animals affected by contagious and infectious diseases; but the lack of uniformity in these laws and modes of investigation, arising from local rather than general or national legislation, and the indifference of legislatures of other States in this regard have rendered the noble motives and attempts of the above-mentioned States almost useless against the general dissemination of those diseases. To prove the prevalence of these diseases, a few facts culled from home as well as foreign authorities will here be given. The commission on contagious diseases among cattle of the State of New Hampshire in 1865 reported to its governor as follows:

"The contagious pleuro-pneumonia was introduced into Massachusetts by Mr. Chenery, of Belmont, in the spring of 1859. He imported three cows and a heifer, which arrived in Belmont May 23, 1859. Two of the cows were found in a bad condition when they arrived, and both died in little more than a week."

On the 20th of June, 1859, a third cow was taken sick and died in about nine days.

The disease spread rapidly, and during the subsequent two months he lost many others. He sold three calves to go to North Brookfield and one cow to go to South Malden. These animals had been exposed, and subsequently became sick, and distributed the infection to a number of herds in Massachusetts. Through this source the disease was introduced into New Hampshire.

In 1867 the so-called "Texan fever," that had so often swept off the cattle in Kansas and Missouri, was finally conveyed to Indiana and Illinois, where it committed fearful havoc. From the report of the delegates of the Board of Agriculture of the Province of Ontario we learn that no less than five thousand out of fifteen thousand landed at Tolono, Ill., perished of this disease. The meat that then came from the Western States became dangerous to the lives of the consumers in the East. This so alarmed the States of New York and Illinois, that commissioners were appointed by the governors of these States for an investigation into the history and cause of this disease, its mode of propagation, and how to provide for the prevention of its spread. Dr. Stephen Smith, commissioner of health, Dr. Elisha Harris, and Moreau Morris, and other eminent sanitarians, accepted the duties of this investigation with that marked earnestness so prominent in all their efforts in behalf of the health of their community. To these gentlemen the country owes thanks for one of the most thorough investigations and reports regarding diseased cattle that has been made in this country. By these investigations, in which the commissions of Indiana and Illinois joined, it was soon found that the fatal disease had spread with fearful rapidity through several counties of the States of New York, Indiana, and Illinois. The unwelcome news greatly alarmed not only our own people, but the people of the foreign countries—of England especially—which imported our meat for their consumption. The apprehension produced by the ravages of this disease became so great in England, that the London Times, in a leading editorial, warned the English people with these words:

"From Illinois the disease spread to the adjoining State of Indiana, where thousands of cattle are still said to be dying of it, and to the city of Chicago. The next step in its progress was that some Illinois cattle were dispatched by railway to Pittsburgh, in Pennsylvania. Before reaching Pittsburgh a large proportion of them perished, and others died in the Pittsburgh drove-yards. Thence some apparently healthy animals were sent by rail to New York, but the fatal symptoms appeared after their arrival, and within ten or twelve days after the appearance of the cattle at Pittsburgh the disease had penetrated to the northern part of New York State. The history of the development of the disease, therefore, is complete. From Texas it is traced over the prairies to Illinois, and thence it is followed over railways to the great towns of the West. With us, though the course of the rinderpest is sufficiently established, there are generally some doubtful links in the chain of communication, but in this instance every step is discernible. The gentlemen who thought it a fatal objection to a precautionary measure that it might slightly raise the price of meat in the London market, may, perhaps, accept instruction from the fact that on the appearance of this disease the supply of beef in the markets of New York and Chicago had fallen off at least one-half. They may see that from fear of a slight and very doubtful disadvantage they would have exposed us to the certain peril of an occasional meat famine. This example may also give us occasion to reflect, that at least in the present state of our knowledge we are quite unable to rely on special acts of precaution against the introduction of a contagious disease.

"Here is a disease not less fatal than the rinderpest, of which we have only just heard; and, besides this, its approach is so sudden and so subtle as to leave no time for exceptional measures. Cattle apparently healthy are dispatched to New York, and within three days after their arrival they have given birth to a malady which may destroy all the stock in the State. That is the danger to which we are exposed the moment we relax our restrictions. Inspection might some day fail to detect the germ of disease in half a dozen animals, and the cattle of as many countries might be decimated in a month. Our knowledge is not sufficiently extended, our means of information not sufficiently complete, our methods of observation not sufficiently subtle for inspection to offer any sufficient security. It is somewhat singular that we should only now be learning to what subtle and contagious diseases our most valuable stock is exposed. Like other knowledge, this has probably been lost from mere want of due records. If the past history of the diseases of mankind had been preserved for us, medical science might now be in a very different position. This disadvantage will scarcely be allowed to check our progress for the future. The New as well as the Old World will yield experience, and we think we may fairly expect from our men of science that, with their means of observation, they will materially advance our control over the conditions of health. At all events such an example as the present deserves the utmost attention, and we shall await with the greatest interest the further history of the Texan fever."

Several State commissions and the commission of the United States above referred to have traced the diseases of cattle, and particularly the epidemic of 1868, from place to place, and the history of these diseases and epidemic are given in their several reports. From these somewhat extended investigations Mr. J. R. Dodge, of the Agricultural Department, sums up as follows: * * *

"10. Liability to infection is so imminent that few exposed animals escape. When circumstances favor the greatest virulence of the disease whole herds have often been destroyed and the cattle of entire districts nearly all swept away, while beyond the line of exposure, distinctly marked as the boundary of a sweeping conflagration or resistless tornado, not a herd nor an animal has been touched. * * *

"12. The losses from this disease for a few years prior to the war, and for years since its close, cannot be accurately stated, but undoubtedly amounts to several millions of dollars. The greatest fatality has been in Missouri and Kansas. In 1858 the loss in Vermont County, Missouri, was $200,000. Losses were widely distributed and severe throughout Southern Kansas and Southwest Missouri, 1866 and 1867; in 1868 they were less in these States as the result of general enforcement of restrictive laws, but were heavy and alarming in Eastern Illinois and Western Indiana, when the prairie pastures of those States were for the first time occupied by cattle direct from Texas. The deaths numbered about 5,000 in Champaign County, Illinois; 1,500 in Warren, 600 in Benton, 400 in Jasper, Indiana, and many counties in these and other States were involved to a less extent. The mortality of 1868, reported by our returns, amounts to at least 15,000 cattle."

Regarding the "lung fever" we have the following pertinent remarks from The National Stock Journal of March, 1878. After giving the history of this disease in foreign as well as in our own country, it says:

"Now comes the question pregnant with weal or woe to our future stock, agricultural, and national interests. Shall we learn from the disastrous experience of others and extirpate the lung plague from the United States while it is still possible, or shall we sit quietly by with folded hands and await the inevitable, early or late, infection of our open Western stock ranges, and then repeat for the benefit of other nations the already twice-told tale of a desperate and extravagant but fruitless attempt to suppress a plague which we have criminally allowed to pass beyond our control? With or without a prodigal but vain effort to crush out the poison the result may be thus summed up: The infection of stock-yards, loading bunks, cars, and markets, and a general diffusion of the plague over the Eastern States. This would imply a national loss by cattle disease like that of England, but much more extensive in ratio, with our great numbers of stock. Thus England, with her 600,000 head of cattle, has lost in deaths alone from lung fever in the course of forty years over $500,000,000. We therefore, with our 28,000,000, should lose not less than $2,000,000,000 in the same length of time, allowing still a wide margin for the lower average value per head in America, and this drain is for deaths alone, without counting all the expenses of deteriorated health in the survivors, of produce lost, of loss of progeny, of loss of fodder no longer safe to feed to cattle, of diminished harvests for lack of cultivation and manure, of quarantine and separate attendants whenever new stock is brought on a farm, of cleaning and disinfection of sheds and buildings," &c.

Dr. James Law, in his statement to the senate committee on agriculture, gives this warning:

"For ten years I have been publicly warning the country of the danger of allowing this disease to extend to our Western States and Territories. Infection of the western herds means speedy infection of all the cattle cars of the railways, yards, loading bunks, &c., and the starting of a constant stream of infected animals towards our Eastern States and markets. This means a uniform infection of the country and losses of thousands of millions of dollars in a short space of time.

In the "investigation of the swine plague," conducted under the direction of the Commissioner of Agriculture, published in 1879, are found the reports of Drs. Detmers, Law, Hines, and others, which show the terrible fatality of that disease among the swine.

The loss from this disease alone amounts to millions of dollars annually. I might go on indefinitely quoting the testimony of scientists, and of hundreds of intelligent and earnest men, to prove that diseases fatal to cattle are scattered abroad in our vast country to the great injury of our commerce and our revenues, and to prove, also, how impotent local legislation has been in preventing the same; but the facts are so well known that I consider it unnecessary to produce further testimony.

The injury to our commerce, our industry, and our national wealth forced upon us and maintained by this loss of cattle—a loss which, from being spasmodic, has now become constant—is impossible to calculate on account of the want of uniform legislation by the States for the collection of statistics for the proper observation, and for the lack of a uniform system in the modes of prevention and cure. Yet when we find that one dealer alone furnished the city of New York with 40,000 horned cattle for consumption, valued at over five millions, in one year, our mind staggers before the appearance of so fatal a disease.

Again, we are aware that no organization exists which should protect all our States, cities, and districts alike against the introduction of meat from diseased animals in our markets. The noble efforts of some few boards of health, who are in advance of others, and who are supplied with the means of making examinations and of keeping a constant vigilance over the shambles of meat dealers, are too limited to receive much consideration in a question of such general and national import.

It is well known that meat from diseased animals is constantly exposed for sale in our markets; then the question arises, what injury to human life the consumption of such meat may induce. Besides the actual consumption of cattle as food, it should not be forgotten that malignant diseases are conveyed from cattle to man by contact and by infection. Every butcher who slaughters an animal, or who dresses, tries, or renders the same, or who attends said animals when sick, is exposed to absorb a virus which may prove fatal to his life.

It has often been stated that persons have partaken of diseased meat, of meat in a state of putrefaction, without ill effects upon their economy. But this may be true only apparently, and it is a negative argument at best, for said persons may not exhibit symptoms of disease immediately upon eating such food, but may eventually become affected by a disease which they would fail to trace to this remote cause. This might be the case in feeding on meat from tuberculous animals. The seed of the disease implanted in the human system may not develop to any great magnitude immediately, or very soon after that act, but it may remain and slowly grow to such proportions as to enfeeble the constitution and finally develop in a formidable disease. During an epidemic of this fever in cattle it was noticed that deaths from diarrhœal diseases had greatly increased in the cities of New York and Brooklyn. If this was a solitary fact it might be taken as a coincidence, but it has been observed by sanitarians that diseased meat will often produce great disturbance of the chylopoietic viscera. It is also because all the facts concerned in these maladies are not recorded or examined into, that we plead for an organized system that will cast light on this vital question.

We have the highest authority for saying that certain diseases of animals are communicable to man. Professor Virchow, of Berlin, the greatest living pathologist: Dr. William Budd, of Bristol, England; Professor Letherby, of London, and many other pathologists have traced a direct relation between the carbuncular disease of cattle and the malignant pustule of man.

In the twelfth report of the medical officer of the privy council of England we find the following statement by Dr. Thorne on the effects produced on the human subject by consumption of milk from cows having "foot-and-mouth disease." In this report an affection of the human subject is described which is traced beyond a doubt to the use of milk from cows affected with the foot-and-mouth disease, viz, ulcers on the mucous membrane over the lips and gums and underneath the tongue, with enlargement of the tonsils and submaxillary glands. Slight febrile symptoms accompanied this condition, which, having lasted about three weeks, left the patient very much debilitated. Dr. Thorne, after a wide examination of the subject in various districts and towns in England, reaches this conclusion: That a disease appears sometimes to have been produced in the human subject when milk of cows suffering from mouth-and-foot disease "has been freely used without being boiled."

Professor Gamgee, a scientific veterinarian of England, and employed by that government to make extensive investigations, relates three instances, one in which fifteen hundred men were known to be fed on diseased meat, in another where several hundred soldiers, and in another where seventy persons fed on the flesh of cattle diseased with pleuro-pneumonia. They were seized occasionally with vomiting, diarrhœa, and abdominal pains, and concludes that "the contamination of the animal (by this disease) has affected the health of the people to an extent becoming more and more appreciated the more the subject is investigated; and last year, while investigating under the authority of the government, my opinion became confirmed that the flesh of cattle affected with pleuro-pneumonia, when eaten by man, induces boils and carbuncles to an incredible extent."

Dr. J. Kercheval, of Bardstown, Ky., as far back as 1819, made observations on a remarkable disease among cattle and its propagation in the human system, and describes the disease as follows: "The disease made its appearance in 1819, and its fatality was so great that horses, cows, and sheep were alike the victims of the fury. Cattle apparently in good health in the morning would be dead before night. The external signs of disease were an intrimescence, sometimes originating in the throat, but generally commencing at the breast and extending along the flanks. Those swellings were soft and elastic, resembling inflations, and, upon post-mortem examinations, were found to contain extravasations of grumous blood and effusions of coagulable lymph, and were of a dark and gangrenous appearance. In the human subject this disease, or at least one which was derived from it, commenced in a small circumscribed vesicle, containing a dark turbid fluid, exhibiting an appearance not unlike that which is sometimes excited by the first effects of spurious vaccine matter. Almost simultaneous with the appearance of the local affection, which was a gangrenous spot, the entire system became more or less deranged: chills, rigors, and fever followed, attended with dull aching pains in the joints and extremities, headache, and a distressing sensation of pains along the spine. Sometimes petechial appeared. All these symptoms were accompanied by much prostration of the vital powers, and the disease exhibited a train of phenomena altogether novel and perplexing. With regard to the origin and character of this disease, it may be observed that *no one* was affected with it who had not previously engaged in flaying or otherwise handling and touching the carcass of an animal that had died of the distemper described."

The "trembles" and "milk sickness" is a disease that finds its way to the human system through the milk of diseased cows.

Professor Drake, in the Western Journal of Medicine and Surgery, vol. 3, says: "If the flesh or milk of animals thus diseased is eaten by man it always produces sickness, and often death. Those who recover from the first effects are left in a sickly condition for years or for life."

An intelligent gentleman related to Professor Percy, of New York, that while traveling in Indiana he ate the flesh of one of these diseased animals at a hotel. A few hours afterwards he was attacked with vomiting and diarrhœa, cramps in the legs, great prostration, &c., which continued for more than a week. A physician in the neighborhood, familiar with the disease, pronounced it to be "milk sickness," but though put under good medical treatment, he lingered in an enfeebled condition all winter, unable to make the slightest exertion.

In answer to the question, "What is milk sickness?" in the United States Medical Investigator of December 1, 1879, Dr. F. E. Steingram, of Bluffton, Ohio, makes the following answer:

"Having resided for a number of years in a section of country where this disease occasionally appears, perhaps I can assist in answering that question. Milk sickness is a disease that affects man, cattle, dogs, and hogs. I have never known it to affect horses and sheep. You can seldom get within two or three miles of where it is without running across some of its victims, and then people are loath to admit that they have it. When it affects animals it is called 'trembles,' from the fact that they usually tremble and shake like aspen leaves when they become the least excited by exercise, and bad cases become so weak that they cannot stand or walk, refuse all food, and die in a few days. As to the cause, there is a diversity of opinions; some claiming that it is weed (the white snakeroot), others that it is caused by emanations from the earth, or from stagnant water. One thing is certain, that it never affects cattle that are pastured on land that has been thoroughly cultivated. Wood pasture and newly cleared land appear to be the only places where they get it. Milch cows often escape being affected themselves, but they transmit the disease through the milk to any animal that drinks it. It is also supposed to be produced by eating the flesh of diseased animals. The *symptoms in man* are: Tired feeling in the limbs, great prostration and trembling, high fever, excessive nausea, and vomiting at first of the contents of the stomach, afterwards of whatever may be taken into it. If there is prolonged retching there may be dejection resembling 'coffee grounds.' There is a burning in the stomach, the tongue is usually coated at first, afterwards it becomes dry and red. The breath of the patient has a peculiar sickening odor, which pervades the atmosphere of the sick room. The bowels are obstinately constipated, and if the patient is not relieved he may die in a few days or weeks."

Pleuro-pneumonia or lung plague of cattle is a disease now admitted by many scientists and pathologists to be exceedingly dangerous to human life. Dr. Livingstone tells us that when the flesh of animals affected with pleuro-pneumonia is eaten in South Africa, by either natives or Europeans, it invariably produces malignant carbuncles.

Professor Letherby, of London, says: "It is a remarkable circumstance, that ever since the importation of this disease into England from Holland in 1842 the annual number of deaths from carbuncle, phlegmon, and boils has been gradually increasing. In the five years preceding that time the mortality in England from carbuncle was scarcely 1 in 10,000 deaths. From 1846 to 1851 the mortality from this disease rose to 2.6 per 10,000 of the deaths, and in the next five years it amounted to 6.2 per 10,000. In the case of phlegmon the increase of the mortality is still more remarkable, for it rose from an average of 2.5 per 10,000 to 8 per 10,000." The Registrar-General of Scotland has directed public attention to this fact, saying that "the deaths from carbuncle are on the increase, and that the mortality from it has been getting larger and larger ever since the lung disease of cattle was imported into Scotland." (*Vide* Letherby on Food.)

In the valuable report of the State board of health of Massachusetts for the year 1875, of which our worthy Dr. H. I. Bowditch was president, in an excellent paper on "Our Meat Supply and Public Health," by Dr. Charles F. Folsom, secretary of said board, many facts are produced and many authorities cited to prove that meat from diseased animals is dangerous as food to human beings. He speaks also of many families who were made ill in one of the towns of Massachusetts from eating meat which did not look suspicious, but came from a sick bull. He says also that in Genoa, when diseased meat was sold, epidemics were frequent and gangrene common. In his summary he says: "In the facts presented there are surely grounds for the suspicion expressed a short time ago by one of our most careful and eminent observers, that 'we are a much meat-poisoned people.'"

The State of Massachusetts, however, with that intelligence that guides it in all its healthful legislation, did not hesitate to spend $70,000 to get rid of pleuro-pneumonia, and we agree with the secretary of its State board of health that its laws, rules, and regulations, and the enforcement of the same by competent and efficient officers, are not to be surpassed by any State. Would that they were!

"Trichina spiralis" is as common as it is formidable. The effect of trichina in man is to turn his flesh into a mass of living worms, torturing him to death. A mouthful of under-cooked pork so diseased has produced such an effect in man many a time, and volumes have been written to describe this disgusting and frightful disaster, resulting in sickness and death. Yet Americans are pork-eating people, and but few are the cities in the States that have inspectors for the purpose of preventing so great a calamity. Other parasites that infest the lower animals find their way into the viscera of man.

The "cysticercus" of the veal and beef, and of the measly hog, unless thoroughly boiled or baked, will be liberated from their little sac by the process of mastication, or by the dissolving power of the gastric juice, pass into the human intestines, fix themselves by their little hooks, and joint after joint quickly grow into a tape-worm.

The rot in sheep is due to the presence in the liver of the fluke-worm, which passes into the intestines and its eggs deposited on the moist grass from which it is scattered far and wide, and may reach such greens as man partakes of. This disease is so common in sheep that in one single year, it is calculated, over two million sheep died in England from it.

Facts and authorities could be multiplied *ad infinitum* to prove the contagiousness and infectiousness of diseases of cattle from one to the other, and also from them to man. The same might be done to prove that unsound meat, meat from diseased animals is dangerous to human life when taken as food. But one must rest on the intelligence of American people; these things have so often been written and discussed that it would seem insolence to assume that our people need more instruction on the subject.

The cases referred to in this report are mentioned simply as reminders of the fact that something must be done to protect the people's health, as well as the people's wealth. The logic and the deductions of such history are irresistible.

At this very hour as I write, a dispatch has come from Europe bearing the intelligence that the cattle plague is spreading in Cyprus, and that no horned cattle are allowed to leave or enter Larnica by river or land, and from our consul at Mauritius, on November 10, that 20,000 cattle had died on that island of the plague, and that it is extending to the deer, of which 243 died. Also, that pleuro-pneumonia is spreading rapidly among cattle around Yonkers, N. Y., on account of the negligence of cattle owners; and the inspectors of that locality say that unless the legislature speedily makes an appropriation enabling them to enforce the sanitary regulations, and kill all sick cattle with or without the consent of the owners, a far-reaching epidemic is inevitable.

The Medical Record of January 3, 1880, says: "There are well-founded reports to the effect that the cattle plague is extending itself into Westchester County, and infecting a number of animals. In this city (New York) and in adjacent districts on Long Island, where the disease has been almost epidemic for the past year or two, very active measures have been resorted to by the State commission to arrest its progress. Not only have the efforts in this direction been successful, but the malady has been virtually stamped out. The latter has been accomplished by killing the infected animals, it having been proven that there is no cure for the disease, and that it is highly infectious among horned cattle. The affection, as it appears in Westchester, is of a comparatively mild type, but the ultimate damages to the cattle in making them unfit for milking, unsuitable for food, and unsalable for breeding purposes, are virtually the same."

Having taken a bird's-eye view of these diseases that infect our cattle, let us examine what capital they represent in our country, and to what annual loss this national national capital is exposed.

From Mr. J. R. Dodge, formerly statistician for the Agricultural Department, I learn that we can estimate our present horned cattle at about 35,000,000, our sheep at 37,000,000, our hogs at 33,000,000, our horses at 11,000,000, our mules at 2,000,000.

The value of our horned cattle is estimated at six hundred millions of dollars; of our horses six hundred more; of our hogs one hundred and eighty; of our sheep eighty: and our mules probably one hundred million, making an agregate capital of one thousand five hundred and sixty millions. This immense capital, whose value is not only in the fact that it represents money but actual food, would seem to require the most fostering care of the general government, yet the government has left it almost entirely to the chance legislation of the legislatures of the States. The annual loss of this capital in consequence of this indifference is now estimated at about fifty millions, classified as follows:

Value of horses lost from disease	$6, 000, 000
Value of horned cattle lost from disease	14, 000, 000
Value of hogs lost from disease	20, 000, 000
Value of sheep lost from disease	4, 000, 000
Value of mules lost from diseace	1, 000, 000
Total	45, 000, 000

This value is rather underestimated and is represented by a loss in horses of $6,000,000; of horned cattle, $16,000,000; of hogs, $20,000,000; of sheep, $4,000,000, &c.

What loss we way incur should our exportation of cattle and meat to foreign countries be stopped on account of the prevalence of dangerous diseases among cattle may be calculated from the following official statistics:

From the annual official report of the Bureau of Statistics for the fiscal year ending June 30, 1879, I cull the following data showing our national exportation of animals and animal food.

Export of animals.

Bovine.	Numbers.		Value.	
Years ending June 30.	To Great Britain and Ireland.	Total to all countries.	Great Britain and Ireland.	Grand total.
1874	18	56, 067	$105, 300	$1, 150, 857
1875	110	57, 211	73, 000	1, 103, 085
1876	244	51, 593	31, 220	1, 110, 703
1877	5, 091	50, 001	546, 829	1, 593, 080
1878	24, 982	80, 040	2, 408, 843	3, 816, 818
1879	71, 794	136, 720	6, 616, 114	8, 379, 200

The high price paid by England for the cattle imported from the United States in 1874, '75, '76 is caused by the fact that only a few choice animals were bought for stock purposes. As American cattle became introduced in the market for slaughtering purposes, the price fell, of course, from a fancy figure to a regular market one.

Table of all animals exported.

Animals.	Numbers.		Values.	
	1878.	1879.	1878.	1879.
Hogs	29, 284	75, 129	$267, 259	$700, 262
Horned cattle	80, 040	136, 720	3, 896, 818	8, 379, 200
Horses	4, 104	3, 915	798, 723	770, 742
Mules	3, 860	4, 153	501, 513	530, 989
Sheep	183, 995	215, 680	333, 499	1, 082, 938

Fresh meats exported.

Year.	Pounds.	Value.
1877	49, 210, 990	$4, 552, 523
1878	54, 046, 771	5, 009, 856
1879	54, 025, 832	4, 833, 080

Preserved meats exported.

Year.	To Great Britain and Ireland.	To all countries.
	Value.	*Value.*
1876	$584,404	$908,052
1877	3,411,973	4,547,319
1878	4,284,517	5,102,625
1879	6,252,751	7,311,408

Export of pork products.

Products.	1878.		1879.	
	Pounds.	*Value.*	*Pounds.*	*Value.*
Bacon ham	592,814,357	$51,752,068	732,249,576	$51,074,433
Lard	342,766,254	30,022,133	326,658,686	22,856,673
Pork	71,889,255	4,913,057	84,401,676	4,807,568
Total	1,007,469,866	86,687,258	1,143,309,938	78,738,674

Total exports of 1879, *of—*

Pork products	$78,738,674
All animals	11,464,131
Fresh meats	4,833,080
Preserved meats	7,311,408
Grand total	102.347,293

What does our government spend to foster and protect this great capital and revenue? Not one dollar. And yet the interest on the revenue on this exportation alone would amount to more than $5,000,000 per annum. Moreover, the revenue from exportation from this source increases greatly every year. Notice, for instance, 18 cows exported to England in 1874, against 71,794 in 1879. What politico-economist can stand and look at these figures with indifference?

An expense of probably $200,000 per annum would cast around this enormous capital a protection which would save at least 50 per cent. of the present known loss, namely, $25,000,000 per annum.

Accepting these facts as correct, so far as our present knowledge can reach, can it be doubted that the general government has a great duty to perform in this regard? Can it be doubted that a sanitary system ought to be organized under the immediate supervision of the national government? Every individual in the country, rich and poor, is affected by this terrible and preventable waste. The national wealth is decreased, the cost of food increased, and the health of man constantly exposed. I am therefore in favor of a national sanitary system for the prevention of contagious and infectious diseases of cattle and for the prevention of the sale of unwholesome meat, and I believe the following plan, which, when modified according to a better knowledge of the condition of things and the necessities of the case, may serve to check diseases that now threaten the decimation of one of the most important and valuable products of our country.

PLAN OF NATIONAL ORGANIZATION FOR THE PREVENTION OF CATTLE DISEASE AND THE SALE OF UNWHOLESOME MEAT.

1. There should be a national sanitary bureau, whose duty it shall be to make rules and regulations for the transportation of cattle from State to State, or from foreign countries. Also to make rules and regulations for the prevention of the dissemination of contagious and infectious diseases among cattle.

2. Sanitary stations should be established on all routes known to be frequented by droves of cattle from one State to another, and particularly on the lines of railroads transporting cattle from the State of Texas or from foreign lands.

3. These stations should be at such distances from one another as will prevent cattle from remaining too long confined in the trains.

4. At each station there should be a veterinary surgeon, appointed by the bureau, who shall have power to condemn, and even kill and bury, such animals as are in a condition to propagate the disease.

5. At these stations the animals shall be properly fed and watered, and allowed to remain for sufficient rest.

6. At these stations cattle suspected of a contagious or infectious disease may be quarantined until the period of incubation is passed.

7. Each station should be provided with sheds for the protection and care of these animals.

8. Each station should be provided with disinfectants, and the yards and sheds should be kept clean and disinfected at all times.

9. Whenever the veterinary surgeon of the station is satisfied that certain cattle may convey an infectious or contagious disease, though apparently healthy, he shall so inform, by telegraph or otherwise, the veterinary surgeon at the next station, so as to have these animals under constant observation during their transit. Cattle thus suspected may be detained at any of the stations until the period of incubation has elapsed. No suspected cattle shall be allowed to be sold for slaughtering, and particularly for stock purposes.

10. The national sanitary bureau shall keep itself informed of the prevailing contagious and infectious diseases; shall collect and keep statistics as to the mortality among cattle; shall consult with and advise the authorities of the several States as to the modes of prevention of these diseases, and shall recommend such legislation and co-operation as will protect all the States alike against the invasion of contagious and infectious diseases among their cattle.

11. This bureau shall have the authority for making such investigations, including chemical and microscopical examinations, as it may deem proper.

12. It shall make a comprehensive annual report of its operations to Congress, with such recommendations as it may deem expedient and salutary.

Such a system, modified, of course, as aforesaid, would give confidence to the people at home and abroad, and the embargo on American cattle in foreign countries removed.

Thus health and industry would go hand in hand and a great moral duty be performed.

TULLIO S. VERDI, M. D.,
Member of the National Board of Health and of the Committee on Cattle Diseases.

Hon. JAMES L. CABELL,
President of the National Board of Health,
and Chairman of the Committee on "Diseases of Animals."

APPENDIX G.

NEWPORT, R. I., *December* 11, 1879.

SIR: As it will not be possible for me to make a complete report upon the gauging of sewers, with which the board has intrusted me, in time to be presented with the annual report of the board, I beg to present herewith a

PRELIMINARY REPORT.

The object of the investigation is to determine the pipe capacity needed for the discharge of domestic sewage.

It has been almost the universal custom up to this time in planning a system of sewers for a town, large or small, to regulate the sizes of the sewers with a view to the removal, not only of domestic and manufacturing wastes, but also of a considerable amount of rainfall. This custom is open to two objections.

1. Sewers large enough for the removal of storm water are so much too large for domestic sewage that they must inevitably be foul and in a bad sanitary condition, except when flushed by storm water. As storm water is often withheld for many weeks together, and often at a season when the decomposition of deposits in the sewer is most active and injurious, this condition constitutes a very grave sanitary defect.

2. While the cost of storm-water sewers may be borne with tolerable ease in a city, where the whole abutting is built up, the distribution of such a charge among the scattered inhabitants of a more village-like town, where lot fronts are often very much larger than in the city, constitutes a serious burden, so serious, indeed, as to be in many instances prohibitory.

There seems to be good ground for the belief that if the sizes of sewers can be adjusted to the removal of foul wastes only, not only will the condition be very much improved, but their cost will be so vastly reduced as to bring their advantages within the reach of the smallest communities.

As the most important step in determining the practicability of the changes above indicated, the National Board of Health commissioned me to institute such a series of gaugings as would determine the actual pipe capacity required. Formulæ in use among engineers would lead to substantially the same result with actual gaugings; but their educational effect would be less marked, because calculations based upon scientific formulæ are less readily comprehended by the average municipal ruler.

In pursuance of the instructions of the board, I have instituted the following gaugings:

a. A sewer in Madison avenue, New York, having, with its branches, a total length of about 7,000 feet, and occupying a district about half built up with houses of good class.

b. A sewer in a single street in Providence, R. I.

c. A sewer with a single short branch in Burlington, Vt.

d. Six sewers in a closely-built part of the city of Milwaukee, Wis.

e. The sewers draining the New York State Lunatic Asylum at Poughkeepsie.

f. A characteristic sewer in the city of Poughkeepsie, N. Y.

g. The sewers draining the Massachusetts hospital for the insane at Taunton, Mass.

h. A large sewer in Saint Louis, Mo.

The total result of these gaugings affords a very fair average result, covering a sufficient variety of conditions. My final report concerning these will be accompanied by diagrams and tables giving an exhaustive representation of the whole subject.

At present I am only able to report in a general way concerning (*b*) the Providence sewer; (*c*) the Burlington sewer; (*d*) the Milwaukee sewers; and (*g*) the Massachusetts hospital.

THE PROVIDENCE SEWER.

The total length of this sewer is 1,391 feet. Its grade varies from 0.86 per 100 to 4.18 per 100. The district which it drains contains 60 houses, all of which are residences, and 41 of which are connected with the sewer. The gauging in this, as in all other cases, was taken at the time of the greatest use of water of the week; *i. e.*, on Monday morning between the hours of 8 and 11 a. m. The depth of flow was measured at intervals of 15 minutes at the time of the maximum flow of the week. The population tributary to the sewer numbers 267. The result showed that the greatest flow of sewage reached a depth of 0.4375 inches in the 12-inch sewer. In the reducer, which brought the current into a channel having a radius of 3 inches, the greatest depth of flow was 0.875. A pipe 1.84 inches in diameter, running full at the same velocity, would carry the greatest flow of sewage from this population of 267.

BURLINGTON SEWER.

The total length of this sewer and its branch is 2,790 feet. Its grade varies from 0.435 per 100 to 3.39 per 100. The district which it drains contains 85 houses, of which 54 are connected with the sewer; 49 of these are dwelling-houses and 5 are stores and shops. The population tributary to the sewer numbers 325. The gauging was taken at intervals of 15 minutes from 7.30 a. m. to 10.30 a. m. The result showed that the greatest flow of sewage reached a depth of 1.2 inches in a pipe of 3-inch radius. A pipe 2.25 inches in diameter, running full at the same velocity, would carry the greatest flow of sewage from this population of 325.

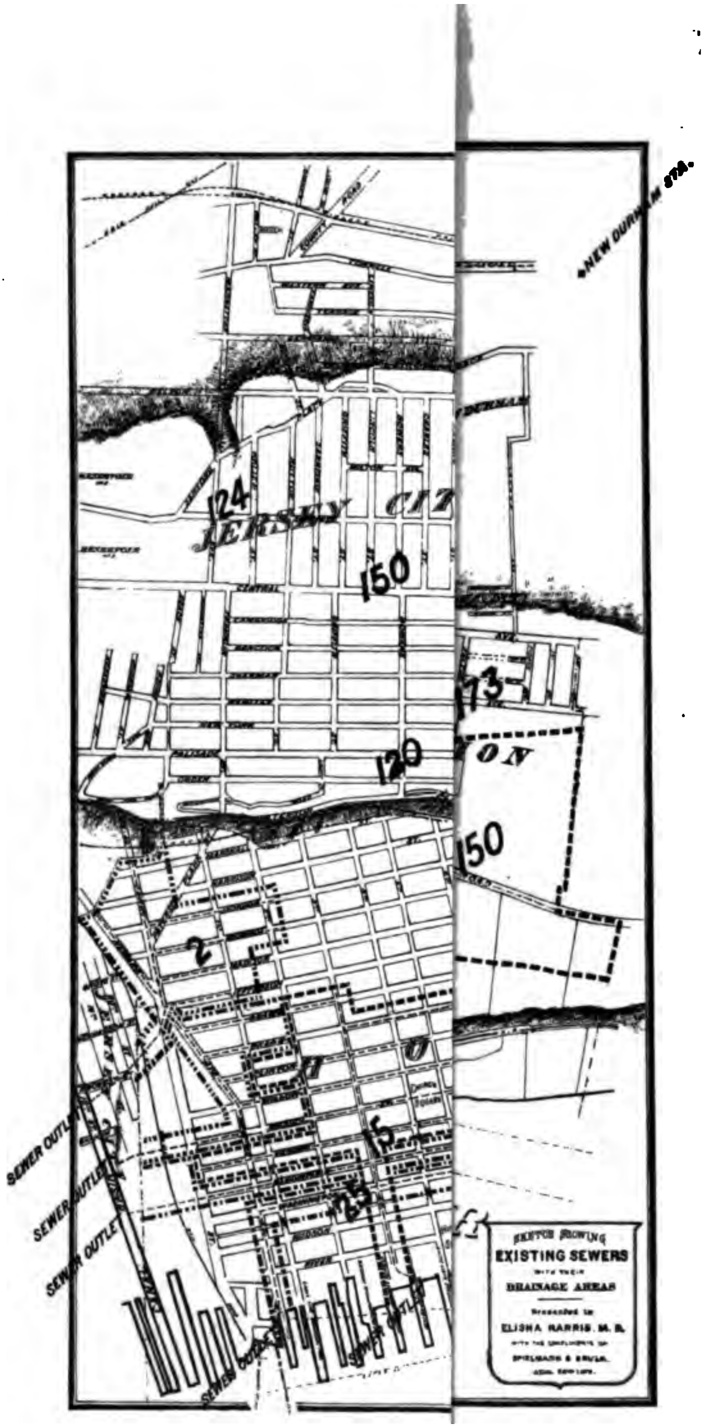
MILWAUKEE SEWERS.

I can at present only say concerning the examination in Milwaukee that the Huron street sewer, 42 inches in diameter, draining 70 acres of closely-built territory, showed a maximum flow 6 inches in depth. The same flow, reduced to a radius of 5 inches, had a depth of 4.5 inches. Reduced to a radius of 4 inches, it showed the same depth of 4.5 inches. Reduced to a radius of 3 inches, it acquired a depth of 5.5 inches.

	Square inches.
The sectional area of the stream in the 42-inch sewer was	121.3
Same for sectional area in sewer of 5-inch radius	33.1
Same for sectional area in sewer of 4-inch radius	27.7
Same for sectional area in sewer of 3-inch radius	27.14

THE TAUNTON HOSPITAL.

The total number of inmates of the hospital is 659. Its sewage is discharged through two different channels—(1) a 10-inch pipe sewer carrying all except the laundry waste; (2) a 6-inch pipe sewer carrying laundry waste only.


NEW DURHAM STA.
JERSEY CITY
124
150
173
ON
120
150
2
H
O
15
25
SEWER OUTLET
SEWER OUTLET
SEWER OUTLET
SEWER OUTLET
SEWER OUTLET
SKETCH SHOWING
EXISTING SEWERS
WITH THEIR
DRAINAGE AREAS
Presented to
ELISHA HARRIS, M. D.
WITH THE COMPLIMENTS OF
SPIELMANN & BRUSH.

A gauging of the maximum flow of the week at the 10-inch outlet, reduced to 3-inch radius, gave a depth of flow of 1.75 inches. A similar gauging in the 6-inch laundry sewer gave a maximum flow at the time of greatest use of 2.25 inches.

The stream discharged by the 10-inch sewer would fill a pipe 2.96 inches in diameter running at the same velocity. The stream discharged by the 6-inch laundry sewer would fill a pipe of 3.51 inches running at the same velocity. The total sewage discharged by both sewers—the maximum flow from a population of 659—supposing its velocity to be the same, would fill a pipe 4.58 inches in diameter. Some light is thrown on the value of this investigation by the fact that the sewer committee of Taunton seriously proposed that the State of Massachusetts should, in consideration of an outlet being furnished for this sewage, join them in constructing a main sewer several miles long, a large part of it being over 5 feet in diameter, the estimated cost being $114,000.

All of which is respectfully submitted.

GEO. E. WARING, JR.

Dr. T. J. TURNER,
Secretary National Board of Health.

APPENDIX H.

SCHEDULES OF QUESTIONS FOR A SANITARY SURVEY OF HUDSON COUNTY, NEW JERSEY, AND BAYONNE, N. J.

The following schedules of questions are printed to serve as suggestions to those engaged in inquiries relating to municipal sanitation, and to form the basis of reports to the National Board of Health upon the sanitary condition of a place:

LIST OF SCHEDULES.

A. Location, population, and climate.
B. Topography.
C. Water supply.
D. Drainage and sewerage.
E. Streets and public grounds.
F. Habitations.
G. Gas and lighting.
H. Garbage and excreta.
I. Markets.
K. Slaughter-houses and abattoirs.
L. Manufactories and trades.
M. Public school buildings.
N. Hospitals and public charities.
O. Police and prisons.
P. Fire establishments, &c.
Q. Cemeteries and burial.
R. Public health laws, regulations, municipal officials.
S. Registration and statistics of deaths and of disease.
T. Quarantine.
U. Municipal sanitary expenses.

SCHEDULE A.

Location, population, and climate of Jersey City, Hoboken, West Hoboken, Weehawken, Town of Union, Union Township.

1. Name of city, county, and State?
Cities of Jersey City and Hoboken, county of Hudson.
Townships of West Hoboken and Weehawken.
Town of Union and Union Township, State of New Jersey.

2. Latitude and longitude?
Jersey City.—Latitude, 40° 43′ north; longitude, 74° 4′ west from Greenwich.
Hoboken.—Latitude, 40° 44′ north; longitude, 70° 2′ west from Greenwich.
Weehawken.—Latitude, 40° 46′ north; longitude, 74° 1′ west from Greenwich.
West Hoboken.—Latitude, 40° 45′ north; longitude, 74° 3′ west from Greenwich.
Town of Union.—Latitude, 40° 46′ 30″ north; longitude, 74° 1′ 30″ west from Greenwich.
Township of Union.—Latitude, 40° 47′ north; longitude, 74° 1′ west from Greenwich.

3. When was the city founded?
Jersey City in 1804; Hoboken in 1804; Weehawken in 1859; West Hoboken in 1861; town of Union in 1852; township of Union in 1861.

4. When was it incorporated?
Jersey City in 1820; Hoboken in 1855; Weehawken in 1859; West Hoboken in 1861; town of Union in 1864; township of Union in 1861.

5. What was its population in 1860? In 1870?

	1860.	1870.
Jersey City	29,216	85,335
Hoboken	9,659	20,297
Weehawken	280	597
West Hoboken		4,132
Town of Union		4,640
Township of Union		2.097

6. What is its present estimated population?

	1880.
Jersey City	114,000
Hoboken	30,000
Weehawken	800
West Hoboken	5,500
Town of Union	5,000
Township of Union	1,800

Since 1875, Guttenberg has been set off from this township.

7. What is its present estimated population under 5 years of age?

Jersey City	20,000
Hoboken	5,400
Weehawken	100
West Hoboken	900
Town of Union	900
Township of Union	300

8. What is the estimated number of native and foreign?

Jersey City:	
Natives	72,000
Foreign	42,000
Hoboken:	
Natives	16,000
Foreign	14,000
Weehawken:	
Natives	500
Foreign	300
West Hoboken:	
Natives	3,000
Foreign	2,500
Town of Union:	
Natives	2,700
Foreign	2,300
Township of Union:	
Natives	1,000
Foreign	800

9. What is the estimated number of persons of European birth?

Nearly all foreigners are of European birth. Those not of European are a very small proportion of the population.

10. What is the estimated number of negroes and mulattoes? Of Asiatics?

Negroes and mulattoes:	1875.
Jersey City	869
Hoboken	44
Weehawken	5
West Hoboken	40
Town of Union	2
Township of Union	1

The following information is desired in the form of tables, to include the last twenty years, or so much thereof as possible, viz: mean, maximum, and minimun temperature of each month; direction and velocity of the prevailing winds in each month; amount of rainfall; mean, maximum, and minimum height of barometer for each month (corrected to freezing point but not to sea level); records of relative and absolute humidity; electricity; ozone; number of clear and cloudy days.

The only meteorological observations that have been regularly recorded and published in Hudson County, as far as could be ascertained, are those of Messrs. Spielmann & Brush, civil engineers, at Hoboken, from July 5, 1874, to date. These have been published weekly in the following newspapers: The Evening Journal, Hudson County

Democrat, and Palisade News. The following tables are compiled from these observations:

THERMOMETER (FAHRENHEIT).

Date.	Maximum.	Date.	Minimum.	Mean.
1874.		1874.		
July 15	84	July 6	73	78
August 21	84	August 27	67	73
September 3	81	September 30	61	71
October 10	67	October 31	46	58
November 23	57	November 30	13	44
December 29	46	December 1	14	33
1875.		1875.		
January 9	35	January 19	11	26
February 24	50	February 9	3	27
March 30	49	March 1	18	36
April 2	58	April 13	34	47
May 22	76	May 1	49	61
June 25	88	June 9	61	72
July 6	84	July 29	70	76
August 16	80	August 2	59	72
September 3	80	September 19	54	66
October 5	68	October 13	46	57
November 13	55	November 30	11	42
December 23	56	December 18	10	36
1876.		1876.		
January 19	54	January 13	23	37
February 12	52	February 24	19	37
March 8	56	March 4	30	41
April 28	67	April 3	42	52
May 19	75	May 3	53	65
June 26	92	June 6	69	80
July 20	91	July 25	69	83
August 7	87	August 21	70	79
September 1	81	September 22	53	66
October 6	66	October 28	44	52
November 2	64	November 27	38	51
December 13	50	December 9	16	30
1877.		1877.		
January 30	43	January 4	17	31
February 22	49	February 13	26	40
March 23	56	March 19	24	41
April 24	75	April 5	46	56
May 19	86	May 2	52	66
June 5	95	June 11	60	75
July 9	99	July 14	72	84
August 26	95	August 15	74	81
September 14	80	September 7	62	71
October 3	73	October 26	47	62
November 9	66	November 30	33	50
December 15	54	December 1	33	43
1878.		1878.		
January 14	43	January 23	19	35
February 28	52	February 19	28	38
March 7	61	March 25	26	48
April 3	65	April 11	50	60
May 3	79	May 12	53	65
June 27	84	June 10	50	71
July 30	94	July 20	57	79
August 1	95	August 12	67	78
September 2	84	September 28	62	70
October 3	75	October 24	51	65
November 12	57	November 9	38	46
December 2	55	December 24	19	34
1879.		1879.		
January 28	49	January 21	17	32
February 17	49	February 15	15	32
March 7	59	March 31	36	45
April 30	67	April 4	35	51
May 31	79	May 2	51	65
June 28	94	June 7	59	80
July 3	93	July 7	71	79
August 2	85	August 11	60	76
September 1	80	September 25	52	66
October 9	77	October 25	40	66
November 15	73	November 21	23	48
December 3	64	December 27	12	41

BAROMETER.

[Corrected to freezing point.]

Date.	Maximum.	Date.	Minimum.	Mean.
1877.		1877.		
April 13	30.38	April 20	29.62	30.12
May 12	30.45	May 22	29.70	30.08
June 12	30.33	June 6	29.87	30.12
July 23	30.37	July 10	29.87	30.09
August 28	30.33	August 10	29.88	30.09
September 24	30.35	September 1	29.93	30.20
October 8	30.40	October 22	29.76	30.12
November 21	30.69	November 2	29.62	30.26
December 21	30.75	December 31	29.67	30.29
Average for the year	30.15			
1878.		1878.		
January 8	30.77	January 11	29.50	30.16
February 19	30.42	February 22	29.81	30.10
March 9	30.63	March 4	29.66	30.18
April 25	30.92	April 5	29.42	30.03
May 20	30.30	May 27	29.84	30.05
June 28	30.26	June 10	29.76	30.09
July 11	30.29	July 22	29.78	30.11
August 31	30.30	August 9	29.81	30.04
September 23	30.56	September 13	29.86	30.24
October 26	30.42	October 19	29.73	30.11
November 15	30.64	November 22	29.26	30.05
December 20	30.50	December 4	29.61	30.05
Average for the year	30.10			
1879.		1879.		
January 11	30.50	January 25	29.56	30.10
February 28	30.86	February 12	29.51	30.19
March 1	30.70	March 31	29.35	30.21
April 22	30.36	April 3	29.45	29.91
May 10	30.56	May 21	29.76	30.07
June 20	30.21	June 16	29.50	29.94
July 2	30.23	July 12	29.60	29.95
August 21	30.17	August 8	29.74	29.97
September 26	30.41	September 4	29.82	30.13
October 25	30.63	October 28	29.63	30.15
November 5	30.50	November 20	29.50	30.15
December 1	30.48	December 15	29.75	30.21
Average for the year	30.08			

HUMIDITY.

1878.		1878.		
June 1	97	June 6	61	78
July 12	93	July 20	57	76
August 18	97	August 12	67	79
September 13	97	September 27	71	83
October 18	93	October 10	71	81
November 18	97	November 13	74	85
December 2	1.00	December 13	78	88
1879.		1879.		
January 9	96	January 25	84	91
February 11	96	February 15	88	92
March 17	96	March 12	70	86
April 18	1.00	April 23	67	85
May 20	95	May 22	72	83
June 3	91	June 13	70	80
July 26	98	July 16	63	76
August 16	93	August 6	68	84
September 8	93	September 18	62	81
October 18	89	October 29	75	84
November 28	1.00	November 1	69	83
December 6	1.00	December 12	81	91

RAINY AND CLOUDY DAYS.

Date.	Number of days during which rain fell.	Number of cloudy days but no rain.	Total.
1877.			
April	5	1	6
May	1	7	8
June	5	7	12
July	3	2	5
August	7	1	8
September	2	7	9
October	8	5	13
November	6	7	13
December	1	9	10
Total	38	46	84
1878.			
January	8	5	13
February	4	8	12
March	6	9	15
April	5	10	15
May	6	8	14
June	5	3	8
July	5	4	9
August	7	5	12
September	3	9	12
October	3	5	8
November	7	6	13
December	6	5	11
Total	65	77	142
1879.			
January	4	6	10
February	9	6	15
March	6	5	11
April	10	7	17
May	4	5	9
June	4	6	10
July	4	7	11
August	6	6	12
September	5	4	9
October	4	4	8
November	8	2	10
December	7	5	12
Total	70	63	133

INCHES OF RAINFALL.

Date.	1876.	1877.	1878.	1879.
January	1.40	2.78	4.93	2.41
February	4.93	2.73	3.47	2.35
March	9.48	5.39	3.80	3.90
April	1.55	3.27	2.08	5.16
May	3.82	1.22	2.95	2.35
June	1.96	3.12	3.16	3.86
July	4.93	5.42	4.89	4.14
August	2.27	2.75	5.89	8.20
September	5.91	1.44	3.06	1.66
October	0.60	7.89	2.52	0.35
November	2.62	5.64	4.75	1.86
December	2.08	0.77	5.43	4.47
Total	41.05	42.42	46.93	40.21

PREVAILING DIRECTION OF THE WIND.

Date.	1877.	1878.	1879.
January		NE.	NW.
February		W.	NW.
March		W.	NE.
April		SE.	NW.
May	NW.	NW.	NE.
June	S.	SW.	SW.
July	S.	NW.	SW.
August	S.	NW.	NW.
September	S.	SW.	NW.
October	SW.	NW.	NW.
November	NE.	NE.	NW.
December	NE.	NW.	NW.

SCHEDULE B.

Topography of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. Is the country surrounding the city level, hilly, or low and marshy?

Surrounding Jersey City it is low and marshy.

Surrounding Hoboken it is low and marshy on the south and hilly on the west. Same is true of Weehawken.

West Hoboken, town of Union, and Union Township, are situated on the Palisade ridge, running north and south, and are bounded on the west and to a certain extent on the east by low and marshy ground.

For further particulars see topographical map accompanying this report.

2. If there are mountains or considerable hills in the vicinity, state distance, direction and altitude above sea-level.

By reference to the topographical map it will appear that a portion of Jersey City and West Hoboken, town of Union, and township of Union, are situated on the Palisade ridge, while Hoboken and Weehawken and the balance of Jersey City are situated at the foot and to the east of it. Otherwise, there are neither mountains nor considerable hills in the vicinity.

3. If there are any marshes or low moist lands in the vicinity, state their distance, direction, extent and character, and the variations as to water which such lands undergo at different seasons.

Jersey City contains about 2,200 acres of marsh lands.

Hoboken contains about 450 acres of marsh lands.

Both the above extend generally from north to south.

Weehawken contains a narrow neck of marsh lands on river front, running also north and south. The surface of these marsh lands is from one to two feet below high water, subject to overflow by reason of high tides and heavy rains.

West Hoboken, town of Union, and township of Union, contain no marsh lands.

4. What is the altitude above sea-level of the bottom of the lowest valley or ravine near by? In what direction does such valley or ravine tend?

There are no ravines or valleys in either of the five cities and towns, except the marsh lands above referred to, and these extend generally north and south.

5. What modifications of meteorological conditions, and what other influences upon health in the city are apparently due to topographical features of its immediate vicinity?

None as regards meteorological conditions. Where the natural drainage of the marsh lands in Jersey City and Hoboken has been intercepted and no adequate system of sewerage supplied, the influence upon the health of the two cities has been very hurtful and the death-rate in those localities from zymotic diseases greatly increased.

6. In what degree and in what direction is the city bordered by grass lands, forests, market gardens, farms, or villages?

There is no forest bordering on either of the cities. To the north of Jersey City and west of West Hoboken and the town of Union there is a ridge slightly above tide-water, composed of market gardens, farms, and grass lands, and about 1.8 square miles in extent, and known as Secaucus.

7. Is the site of the city level?

Jersey City, east and west of Bergen ridge, is generally level, but that portion on top of the ridge is composed of an undulating plateau containing about 4,400 acres. West Hoboken, town of Union, and township of Union, as also the greater portion of Weehawken, are situated upon the continuation of this ridge.

Hoboken.—Of this city 450 acres, composing the marsh lands, are level; the remainder, comprising about 270 acres, is situated on a ridge about 25 feet above high water, between the marsh lands and the river, and rising to an elevation 100 feet at Castle Point.

8. Has the original conformation of the site been materially changed?

Jersey City has been changed only in so far as the improvement and filling in of the marsh lands is concerned. The same change applies to Hoboken.

No material change has been made in either of the other towns of West Hoboken, town of Union, township of Union, and Weehawken.

9. Have original water-courses been diverted, covered, or modified?

In Jersey City, the "Ravine water-course" has been carried to tide-water by a closed sewer, and its outlet diverted to a more southerly point.

In Weehawken, "King's water-course" has been carried to tide-water through a closed brick sewer.

No changes have been made in this respect in either Hoboken, West Hoboken, or township of Union.

10. What is the elevation above sea-level of the highest, lowest, and average level of the town?

The lowest elevation of any portion of Jersey City, Hoboken, or Weehawken is about 2 feet below high water. The highest elevation of Hoboken is about 100 feet above high water. The highest elevation above high water of Jersey City is about 170 feet; of West Hoboken, 251 feet; of town of Union, 196 feet; of township of Union, 255 feet; of Weehawken, 178 feet.

Average elevations of Jersey City above high water, upland, 100 feet; Jersey City, lowland, 10 feet; Hoboken, 12 feet; Weehawken, 150 feet; West Hoboken, 210 feet; town of Union, 170 feet; township of Union, 200 feet.

11. In what direction is the general surface slope of the city?

Of Jersey City the general surface slope is from north to south. So also for Weehawken, West Hoboken, town of Union, and township of Union. In Hoboken it is from east to west.

12. Is any part of the city what is known as "made land"; if so, how much, and in what part of the city?

In Jersey City about 1,400 acres on eastern water front are made land.

In Hoboken about 140 acres in southwesterly portion of the city. None in Weehawken, West Hoboken, or town of Union. In township of Union about 50 acres.

13. What was the character of the ground before filling?

In either Jersey City or Hoboken, where filling was done, the ground was soft and marshy.

14. Was it thoroughly drained before filling?

It was not.

15. To what depth and with what material was it filled?

The depths of the filling ranged between 10 feet and 30 feet. The material was generally earth filling. But considerable filling has been done with ashes.

16. To what extent is the made land built upon, and with what class of houses?

The made land in Jersey City and Hoboken is largely built upon, generally with cheap tenements of frame. There is no made land in the other four places.

17. What streams of water pass through or by the city?

Jersey City fronts upon the Hackensack River on the west and upon the Hudson River on the east. Hoboken and Weehawken also front upon the Hudson River. Otherwise there are no streams passing by or through the cities or towns and townships.

18. What is the average width of each?

19. What is the average depth of each, and what is their velocity; rapid, gentle, or sluggish?

20. Are the sides of these streams steep or gradually sloping; that is, when the amount of water changes, does it cover and expose any considerable width of shore?

21. Is the exposed shore hard ground or mud?

22. Are these streams, or any of them, affected by the rise and fall of the tide, and to what degree?

23. Is the water clean or foul? If foul, what is the source of the fouling?

24. Are the bed of the stream and its shores subject to the deposit of organic matter or of silt? If so, describe the deposit.

25. Is there in the course of these streams any shoal or flat which is at times laid bare or only slightly covered with water?

26. To what extent are there natural or artificial falls of water, as over dams, within or near the city, and what is the character of the fall?

27. What is the character of the stream above such water fall; deep and rapid, or sluggish with shoals?

There are no streams passing through either Jersey City, Hoboken, Weehawken, West Hoboken, town of Union, or township of Union. Therefore questions 17-27, inclusive, are inapplicable to either or these cities and towns.

28. What canal or race passes through or near an inhabited part of the city?

The Morris Canal passes through the southerly portion of Jersey City. Otherwise there is none.

29. Is the water in such canal usually clear, turbid, or muddy?

The water is usually turbid.

30. Does foul surface drainage or sewage enter any of these streams? If so, describe manner and location of such entering.

31. If tidal stream, is such sewage or drainage borne up past the town by the incoming tide?

There are no streams. See above.

32. What bodies of water and what their locality, character, and extent, within or near inhabited portions of the city?

Hudson River, Hackensack River, Newark Bay and New York Bay. Hoboken and Weehawken are bounded by the Hudson River on the east. Jersey City is bounded by the Hudson River on the east, by the Hackensack River on the west, and its southerly portion is in proximity to the Newark Bay and New York Bay.

33. For what period of time, and at what seasons of the year, and at what stage of the tide is there stagnant water in any canal, stream, pond, or other body of water within or near an inhabited part of the city?

34. Does such stagnant water at any time emit a perceptible odor, and does it deposit organic matter or mud?

There is no stagnant water in any of the above-mentioned bodies of water.

35. Furnish, if possible, a contour map of the city and immediate vicinity, on which are indicated the altitudes and the lines of main drainage and sewerage, or of natural drainage.

See large topographical map.

36. Is any part of the city, or its vicinity, subject to overflows, or saturation of soil; if so, to what degree, at what seasons, and what is the effect on health?

37. How does such saturation, whether from overflow or from rain, affect the height of water in wells, and to what extent?

The made lands of Jersey City and Hoboken, and the marsh lands of the above cities, and also of Weehawken, being filled in only to a height of from 2 to 5 feet above high water, are subject to overflow at every high tide and extraordinary rain. The marsh lands are constantly saturated with water. The effect upon health is to largely increase the death-rate from zymotic diseases. There are no wells upon these lands, and therefore no effect as to height to be recorded.

38. To what geological period or formation does the site and vicinity belong?

To the Triassic formation.

39. What are the surface rocks?

40. What are the underlying strata in order of succession from above downwards.

41. What is their relative permeability by water?

For all these places the surface rocks are trap and red sandstone. Next below there is serpentine, and lowest the gneiss. There are none of them permeable to water to any considerable amount.

42. In what direction do they dip, or slope, and at what angle?

43. What is the character of the surface soil?

44. When it is disturbed, have malarious effects been observed?

45. Are there continuous fissures in the rock or continuous gravel streaks in the earth through which soil water may flow?

46. Are any diseases considered to be due to the soil or geological formation, or has the spread of any epidemic followed the direction of the flow of underground water? If so, specify, and state reasons for so reporting.

The sandstone and trap dip towards the northwest at an angle of 10 degrees or 15 degrees. The serpentine and gneiss are nearly vertical. The salt marsh covers a large surface, and its substance, which is of very recent age, fills deep valleys or channels in the rock between the edge of the North River and Bergen Hill. Malarious effects have been observed wherever excavations, such as for streets and sewers, have been made. There are no continuous fissures in them. Glacial drift covers the rocks in Jersey City and a part of Hoboken. No diseases, as far as known, are considered due to the soil or geological formation.

SCHEDULE C.

Water supply of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. From what source is the chief water supply derived?

Jersey City and Hoboken are supplied with water from the Passaic River.

Weehawken, West Hoboken, town of Union, and township of Union have no water supply other than derived from wells and springs.

2. If from a river or stream, what towns, villages, factories, or other sources of contamination are located upon the river or stream above the point at which the water aken?

North Belleville, Rutherford Park, Passaic, and Paterson are located above the poins at which the water is taken.

3. To what extent is the immediate gathering ground from which the water it drained manured with night-soil or other excrement?

No means of answering.

4. From what distance is the water brought?

5. In what form of conduit?

6. What is its capacity?

The water is brought to Jersey City and Hoboken from a distance of about 7 miles through three circular iron conduits, two of which are 36 inches in diameter, and one 20 inches in diameter.

7. To what extent and at what points is it accumulated in settling or other reservoirs?

8. Is any process for filtering or purifying used beyond reservoir settling?

The river is tapped at a point on the east bank of the Passaic, opposite Belleville, where the pumping station is located. From here the water is carried a distance of about 2,500 feet and raised 160 feet into reservoir No. 1. From thence it is carried through three conduits to reservoir No. 2, the distributing reservoir, the elevation of which is 130 feet above high-water, located on Jersey City Heights. There is no process for filtering or purifying in use.

9. What is the average amount of water per diem flowing into reservoirs; their highest capacity for storage?

10. What is the average amount of water per diem; the maximum, the minimum?

11. How many gallons daily to each inhabitant; the average, the maximum, the minimum?

12. How much water is on an average in storage in reservoirs and available in case of fire?

Average amount of water per diem flowing into reservoirs is 1,663,514 cubic feet for 1879. Their highest capacity for storage is 73,437,000 gallons. The average amount of water per diem for 1879 was 1,663,514 cubic feet. This would make a daily average to each inhabitant of about 87 gallons.

13. Give results of chemical analysis, if possible.

14. Has the water supply been offensive in taste or odor at any time; if so, at what time, and to what was the change due; and if it has been remedied, how?

From Professor A. R. Leeds' report to board of public works of Jersey City, 1873.

Chemical analysis of the Passaic and reservoir waters.

PASSAIC RESERVOIR.

	Parts in 1,000,000.	Grains per gallon.	Parts in 1,000,000.	Grains per gallon.
Total solids	67.8	3.95	70.7	4.12
Inorganic matter	50.9	2.95	54.9	3.20
Volatile and organic matter	16.9	0.99	15.8	0.92
Silica and suspended water of mineral origin	23.08	1.35	14.80	0.87
Alumina and oxide of iron	1.28	0.976	0.93	0.054
Lime	12.11	0.71	11.32	0.66
Magnesia	2.92	0.17	8.98	0.52
Potash and soda, existing as potassium and sodium combined with sulphuric acid and chlorine	8.13	0.47	8.66	0.51
Sulphuric acid as SO4	8.04	0.46	8.96	0.53
Chlorine	3.73	0.22	3.94	0.23

During midsummer of 1872, when the water as drawn from the taps of the Stevens Institute of Technology, was highly offensive both to the smell and taste, was turbid from the presence of great numbers of microscopic, vegetable, and animal organisms, when proper chemical tests revealed a shocking degree of contamination by organic matter, and when it could not be used at all for delicate chemical operations. (Professor Leeds' report.)

No remedy has been provided.

15. To what extent is the town supplied with public fountains? With fire plugs?

Jersey City has two public fountains; Hoboken has one; Weehawken, West Hoboken, town of Union, township of Union have none. Jersey City and Hoboken both have fire-plugs from 200 to 400 feet apart on the built-up portion. Other places have none.

16. To what extent is water from artesian wells used; what is the depth of such wells?

17. What is the character of the water?

18. What is the chance of organic contamination reaching the strata by which the well is supplied?

[Extract from the annual report of the State geologist of New Jersey, 1879.]

BORED WELLS IN JERSEY CITY AND VICINITY. BY L. B. WARD, C. E., OF JERSEY CITY.

Borings of considerable depth in search of water have been made within the past half century in various parts of Hudson County, and in locations differing widely as to topography and geological associations. A geological boundary, which passes through Hoboken and Jersey City, and which is in its general bearing parallel with the Hudson River, has been closely touched by the borings made in the tract east of Bergen Hill, these having in every instance entered the underlying rocks. An example of rock-boring for water is also found upon the crown of the Bergen trap ridge.

In the marshes west of the Hackensack River are a number of wells, which have been bored through alluvium and bowlder clay. Four of them, which were sunk in 1871, derive their supply from a sheet of water-bearing gravel, at a depth of nearly two hundred feet, the water rising to the surface and flowing off in moderate quantity. The water, while it is palatable, has a noticeable taste, said to be of sulphur. The wells now mentioned are upon the line of the Newark plank road. An equal number of wells are to be found on the line of the old Newark turnpike; these are now disused, and their origin and depth are unknown.

Diligent inquiry has failed to find where any rock-borings have been made in that part of Hudson County south of Jersey City. The large works established upon the shores of Kill Von Kull depend for water either upon capacious shallow wells or upon tubular (driven) wells. The need of suitable supply of water is felt here.

Upon the smaller islands in the New York harbor, geologically related to Jersey City and Hoboken, no borings of water are known to have been made. On Staten Island a successful well was obtained a number of years since at the silk mill in New Brighton by boaring to a depth of 400 feet in the underlying serpentine.

NOTES OF THE PRINCIPAL ROCK-BORINGS IN HUDSON COUNTY.

Jersey City.—At Mattheisen & Weichers' sugar refinery, on the south side of the Morris Canal, in Jersey City, a boring was begun in 1867, which was discontinued in 1872, at a total depth of 1,000 feet, inclusive of 20 feet of surface earth, the diameter of which in the upper 180 feet of the rock was 8 inches, and in the lower 800 feet 4 inches. The rocks penetrated were chiefly gneiss and quartz, with white sandstone and thin bands of slate occuring below 800 feet. Several veins of water were met with between 600 and 900 feet, of which the most important were at a depth of 720 feet. The yield was found to be 50 gallons per minute when tested by pumping. The level in the well being 12 feet below tide, and the temperature of the water 52° Fahr. The brackish quality of the water obtained has prevented its use, and the well is closed.

A boring of small diameter was made about 1842 by Mr. Andrew Clerke in the marsh at the corner of Montgomery and Henderson streets, in Jersey City. Here the red sandstone was met with 15 feet below the surface, and was penetrated to a depth of 200 feet, when a stratum of very hard rock of whitish appearance was encountered, and the work abandoned. A liberal supply of clear, bright water, but strongly impregnated with magnesia and common salt, was found at the depth of 150 feet, which overflowed at the surface. The temperature was not noted.

In the same marsh, and about 1,000 feet northeast of the last, an unsuccessful boring was made a few years later, respecting which details have not been obtained.

At Cox's brewery, on Grove street, between Seventh and Eighth streets, in Jersey City, the underlying sandstone is covered by about 70 feet of bowlder clay and earth. A small boring of 100 feet in depth was first made nearly thirty years ago, and was enlarged to 5 inches in diameter and carried down to a depth of 400 feet in 1872 and 1873. Small veins of water were met with in the rock at all depths. The water, though so hard as to form a heavy scale in a steam-boiler, was of satisfactory quality for brewing purposes. Its temperature was 54° Fahr. The well easily afforded 300 barrels of water per day, the water rising in the excavated well to the level of the tide, thence passing away through the earth to the street sewers. The boring intersected a number of streams in the sandstone, which contained fine, earthy matter, and limited the capacity of the well to deliver clear water.

At Lembeck & Betz's brewery, on Ninth, between Grove and Henderson streets, in Jersey City, and 800 feet northeast of Cox's brewery, the sandstone is covered by 40 feet of bowlder clay, with 30 feet of surface sand. A boring 8 inches in diameter was made here in 1875, penetrating the red sandstone rock 776½ feet to reach water, which was found at the bottom in a stratum of white or light-colored stone. At its completion the well, when tested by pumping, yielded 33 gallons per minute continuously for 24 hours. The water is sufficiently soft and sweet for brewing, but is ordinarily used only for cooling purposes, its temperature being 52½ degrees Fahr. The well affords 1,000 barrels of water per day without difficulty, the level of the well being 10 feet below tide, or 25 feet below the surface of the ground.

Borings made to rock at the Pavonia Ferry, distant, viz., 2,300 feet, 2,850 feet, and 3,300 feet nearly east from the last, came upon serpentine at 63 feet, 120 feet, and 179 feet below tide, respectively.

Hoboken and Union Hill.—In the marsh, and near the south end of Grand street, in Hoboken, a boring was made in 1828, which is mentioned in Mather's "Geology of New York" as 400 feet in depth, reaching rock at 40 feet, and has penetrated serpentine, sandstone, and supposed white marble. This boring probably did not come upon water, and the work was abandoned. Mr. Theodore Van Tassell recollects to have seen the boring apparatus remaining in position some years later.

"At the Palisade brewery, at the summit of the main ridge of Bergen Hill, and corner of Hudson avenue and Weehawken street, in the town of Union, a boring 7 inches in diameter was carried down in 1877 and 1878, through trap, to a depth of 297 feet from the surface, water being found in quantity, increasing with the progress of the work. The well is pumped from the bottom, and yields 250 barrels per day of very pure soft water, of a temperature of 51° Fahr. When not pumped it discharges a much smaller quantity, at a level of 161 feet above tide, into the bottom of an excavated well 28 feet under ground and 12 feet below the surface of the rock."

Analysis of water or well of Lembeck and Betz.

	Grains in 1 gallon.
Soda	39.50
Lime	6.95
Magnesia	9.36
Sulphuric acid	4.11
Chlorine	65.50
	125.42

An artesian well is being bored at the Secaucus Iron Works, and near the Hackensack River, in Hudson County. I. P. Pardee, superintendent, has favored the survey with the following account of the strata and the water: The surface of the ground is about 5 feet above tide; from surface down to red shale rock, 18 feet; red shale to 370 feet; shaly sandstone to 395 feet; red, shaly sandstone from 400 to 600 feet; total depth at date (February 7, 1880), 600 feet.

The diameter of the bore is 6 inches. When the hole was down 210 feet they commenced to pump with a 4-inch pipe down 60 feet, and with a seed bag at lower end to keep out the surface water. Pumped about 15 gallons per minute of beautifully clear water, but decidedly brackish to taste.

When the bore had reached a depth of 304 feet they pumped with a 4-inch pipe with seed bag attached, and down 100 feet. The result was a large volume of water, but it was still brackish. On evaporation it gave 110.67 grains of solid matter per gallon, which tasted strongly of common salt. When at the depth of 600 feet they pumped with a regular oil-well pump, with the seed bag attached, and having a 4-inch pipe down 250 feet, attached to the end of which was the pump barrel 3⅝ inches in diameter, making a total length of pipe down 357 feet. The result was only *one* gallon per minute. The 4-inch pipe and the pump barrel were then taken out and put down 200 feet. On pumping got 20 gallons per minute of very clear water, which, when tested with nitrate of silver, gave a slight precipitate. The water, on evaporating, gave 12.37 grains of solid matter. The difference in the volume of water at 257 feet and 200 feet appears to show that about all the water (not salt) which they have obtained so far, comes in between 200 feet and 250 feet down.

They are now putting down the well 400 feet deeper, which will make a total depth of 1,000 feet when it is done.

By way of comparison they had other waters there evaporated to dryness and weighed. The drinking water from the well near the furnace contained 108.76 grains in a gallon; that from the Hackensack River had 307.45 grains to the gallon.

19. To what extent is cistern, spring, or well water used?

Jersey City and Hoboken having a water supply, cistern, spring, or well water are very seldom used.

Weehawken, West Hoboken, town of Union, and township of Union, use it altogether, they having no other means of supply.

20. In that part of the city where well water is used what is the character of the soil?

In the places just described where well water is used, the soil is generally retentive earth overlying trap rock.

21. What is the usual depth of wells to the bottom and to the surface of the water?

The wells usually range from 10 feet to 20 feet in depth to the bottom, and from 5 to 15 feet to the surface of the water.

22. Are cisterns, springs, or wells so located and constructed as to be free from sewage and cesspool contamination?

23. If yes, state reasons for apprehending contamination.

Yes, generally. Because they are usually so located as to be as far as possible from the sinks or cesspools.

24. Has the use of well water been productive of sickness; if so, what sickness; to what extent epidemic or sporadic?

As far as we have been able to ascertain it has not. We have never heard of a case in any of the cities or towns included in this investigation.

25. Character and quality of well water, specially as to presence of organic matter and chlorides.

We submit the following extract from an analysis of a sample well water, made in 1874, by Mr. Amende, a chemist of Hoboken, for Mr. C. F. Holtz, a resident and property owner on the west side of Hudson street, between 7th and 8th streets, Hoboken. He reports it as being healthy and useful in all respects, and containing only such impurities as are usually present in almost any well water.

The solid substances in 1,000 parts were found to be only 1,670, which is extremely little.

Of these solid substances, the following were found in 600 grains analyzed:

	Grains.
Silicic acid	0. 015
Lime salts below	0. 000
Carbonic acid	0. 235
Phosphoric magnesia	0. 921
Sulphuric magnesia	0. 4906

The remainder of the solid substances are found with the above named in most any sample of water, and are potash and soda compounds.

Alkalies are found mainly as chloric and sulphuric compounds. Carbonic salts are found only in very small quantities. Mr. Amende pronounced the well a very good one.

26. Has disease arisen from use of lead pipes?

None of which we have any record.

27. Are there any public baths; if so, how are they arranged, and to what extent are they used? Furnish a copy of their rules and regulations.

28. Are there public drinking fountains? If so, how generally?

There are a few public drinking fountains provided in connection with the public watering troughs for horses.

There is one public bath only in the most populated portion of Jersey City, on Mercer street near Brunswick street. It is a frame building with tank and closets to accommodate about 40 persons at one time. Fresh water is used, and the bath is open to the public from July 1 to October 1, of each year; two days for females and four days for males. It is closed on Sundays. Otherwise there are no rules or regulations.

SCHEDULE D.

Drainage and sewerage of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. What is the area included within the city limits?

Area of Jersey City is about 8,000 acres; of Hoboken, about 720 acres; of Weehawken, about 400 acres; of West Hoboken, about 520 acres; of town of Union, about 275 acres; of township of Union, about 835 acres.

2. What area is closely built up, as compared with what may be called "country or suburban area?"

In Jersey City there are closely built up about 800 acres; in Hoboken, about 230 acres; in Weehawken, about 40 acres; in West Hoboken, about 200 acres; in town of Union, about 200 acres; in township of Union, about 80 acres.

3. What is the character and sufficiency of the surface drainage?

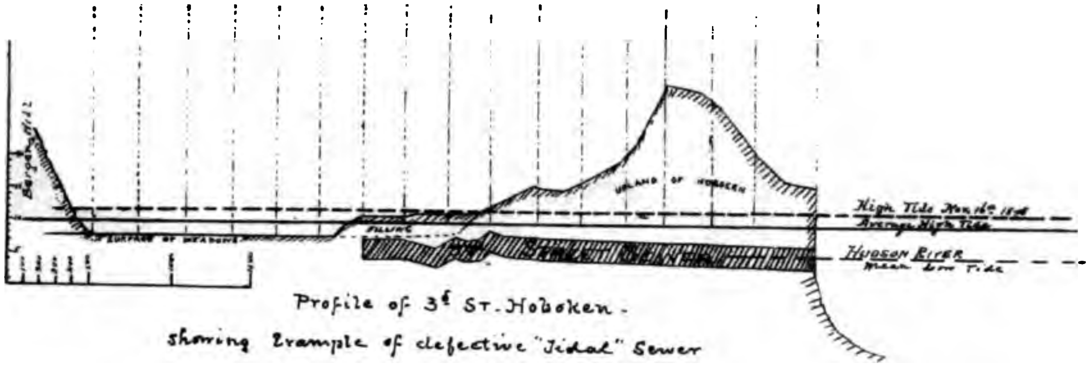
4. Have any underground drains been constructed to act exclusively as such; if so, for what area?

5. At what depth are they placed at the highest point? What rate of fall have they?

The surface drainage of the uplands of Jersey City, Hoboken, and West Hoboken is generally good; that of the low lands of Jersey City and Hoboken, and of certain portions of the uplands of the town and township of Union (as indicated on the map) are often very bad.

No system of underground drains have been constructed, although such a system is perfectly feasible and practicable.

5. Are there swamps, areas of made land, or places saturated with water, near or in the town, which are undrained? If so, describe.

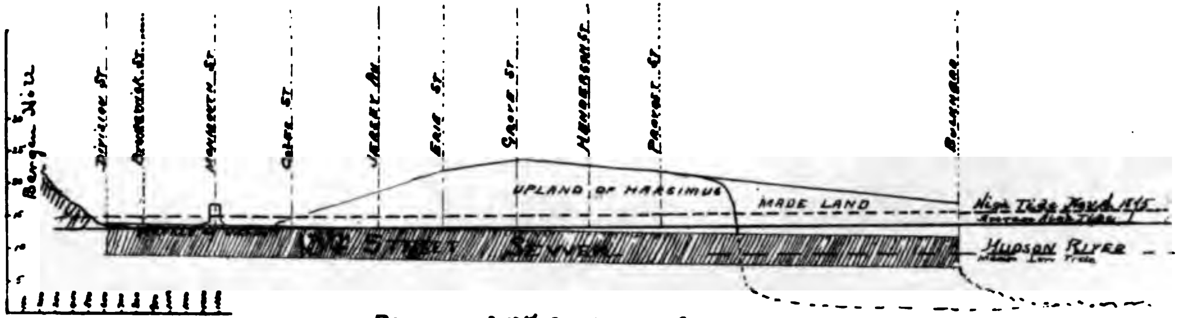


Profile of 3d St. Hoboken.

showing Example of defective "Tidal" Sewer

E. W. Harrison C. E.
Jersey City

Example of a Low-Level Sewer which receives upland Drainage.
and Sew[illegible] with sill and Sewerage.



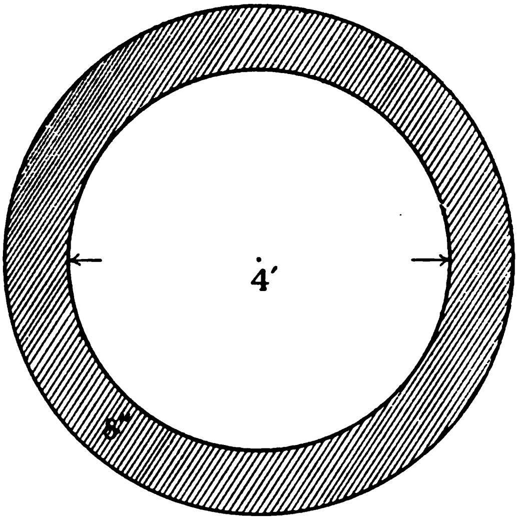
PROFILE of 13th St JERSEY CITY

Showing best example of "Tidal" Sewer

E. W. Harrison C. E.

7. Are the cellars in any part of the town liable to an overflow of water in heavy rains, or to the intrusion of soil water?

There are swamps and areas of made land in the western and eastern portions of Jersey City and in the western portion of Hoboken, which are saturated with water and undrained. They are generally about 2 feet below high water and subject to overflow at high tides and heavy rains.



The cellars of the houses on this made land are liable to an overflow of water in heavy rains, and to the intrusion of soil water.

8. Is there any system of sewerage in the town? If so, is it part of a regular plan? If so, furnish copy of plan.

There is no regular system of sewers in either Jersey City, Hoboken, Weehawken, town of Union, or township of Union. See large topographical map upon which all existing sewers have been plotted.

The following is the plan of sewers adopted for West Hoboken:

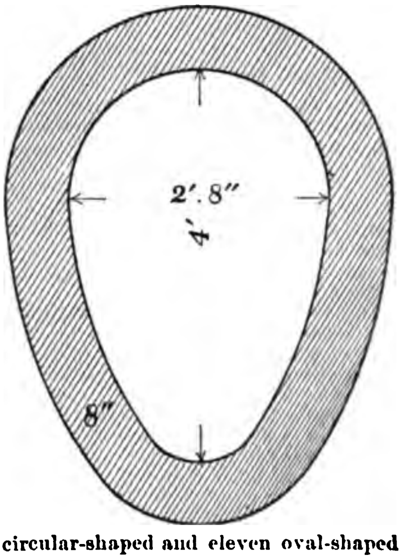
9. How many outlet sewers are there?

10. Where do they discharge?

11. What is their diameter at mouth?

In Jersey City, there are 14 outlet sewers; in Hoboken, there are 6 outlet sewers: and in Weehawken, there is 1 outlet sewer.

One in Jersey City discharges into the Hackensack River; three into New York Bay: two into creeks leading into the Hudson River; all the remainder discharge into the Hudson River.



They are of the following diameters at mouth: one of 6 feet, in Weehawken; one of 5 feet, in Jersey City; three of 4 feet, in Jersey City; seven of 3 feet, in Jersey City; two of 1 foot 6 inches, in Jersey City; one of 7 feet, in Jersey City; one of 4 feet, in Hoboken; two of 5 feet by 4 feet, in Hoboken; one of 4 feet by 2 feet 8 inches, in Hoboken; one of 6 feet by 4 feet 6 inches, in Hoboken; one of 8 feet by 4 feet, in Hoboken.

12. Of what material are they constructed?

13. Are they tightly cemented?

14. Give their shape in cross section.

15. Do they retain deposits, or are they kept entirely clean by their flow?

Generally of brick work laid in cement and built in rubble stone work laid in cement, tightly cemented. For shape in cross-section, see annexed drawings. Those that are laid on a very slight grade and are not connected with heavy grade sewers, so as to be thoroughly flushed from time to time, retain deposits.

Others which carry off the sewage from the highlands and are thoroughly flushed out at every rain and that have a continual flow of water, are thus kept clean. There are three circular-shaped and eleven oval-shaped outlet sewers in Jersey City.

16. Are they kept free from obstruction by artificial means: if so, by what means?

When they have become clogged up with mud laborers are employed to clean them out.

17. What proportion of the area of the city is not sewered?

18. How much of this area is built upon?

Of Jersey *City about 3,300 acres of the area of* the city is not sewered, being a little *over three-eighths.*

Of Hoboken about one-half of the area of the city is not sewered.

The sewerage provided in Weehawken, West Hoboken, town of Union, and township of Union, excepting such as provides for surface drainage through the Bull's Ferry Road sewer, heretofore described, is not of sufficient consequence to be noticed.

Most of the area sewered is built upon.

19. What is the total length of subsidiary sewers discharging into these outlet sewers?

20. Give the size, construction, and shape of the different parts of these sewers, as indicated above for the outlet sewers.

About 262,000 linear feet for Jersey City, or about 50 miles.

About 45,550 linear for city of Hoboken, or about 8.50 miles.

There are none in either Weehawken, West Hoboken, town of Union, or township of Union, except the Bull's Ferry Road sewer and connections which is 5,000 feet in length, or about 1 mile.

21. Does the surface drainage pass into sewers; if not mainly, then to what degree?

22. If so, is their capacity sufficient in heavy storms?

23. Is any attempt made to utilize the sewage; if so, how and with what result?

24. Are the sewers ventilated in any way; if so, how?

25. Are there municipal regulations concerning the drains which connect houses with the sewers? if so, furnish a copy. Are such regulations strictly complied with?

26. Is there a trap required in the course of this connecting drain? If so, state its location and character.

27. Is it compulsory that all house drainage be conveyed to the sewer; if not, to what extent are other means resorted to, and what are the means?

28. Are odors ever perceptible from the sewer openings or outlets; if so, to what extent do they exist?

The surface drainage mainly pours into the sewers. Their capacity in some cases is not sufficient in heavy storms. No attempt is made to utilize the sewage nor is any ventilation provided. There are no regulations concerning house drains. No trap is required. All house drains must be conveyed to the sewer. Odors are sometimes perceptible from the sewer outlets.

SCHEDULE E.

Streets and public grounds of Jersey City, Hoboken, West Hoboken, Weehawken, town of Union, Union Township.

1. What is the usual width of the streets?
2. What is the usual width of the sidewalks?
3. Are the sidewalks paved, and with what material?
4. Do the streets differ in healthfulness or comfort owing to direction? If so, specify.

The streets in Jersey City and Hoboken, and the other town and townships, range from 50 feet to 100 feet in width, with some few only 40 feet in width. In Jersey City, they are usually 60 feet in width, with a few of the principal ones 100 feet in width. In Hoboken, all east and west are generally 50 feet wide and all north and south, with a few exceptions, are 65 feet wide. In the remaining places, Weehawken, West Hoboken, town of Union, and township of Union, they vary from 40 feet to 60 feet in width.

The sidewalks are usually about one-quarter of the width of the street each and are usually flagged with blue stone flagging.

As far as known the streets do not differ in healthfulness, owing to direction, but in point of comfort the south side of streets running nearly east and west and the west side of streets running north and south are generally considered the most favorable and the most valuable and advantageous in a business aspect.

5. What is the total length of streets paved?
6. What is the material generally used?
7. What is the total length of the streets unpaved?

The total length of streets paved, in Jersey City, is about 47 miles; in Hoboken, about 11 miles; in Weehawken, about 2 miles; in West Hoboken, none; in town of Union, about 1 mile; in township of Union, about 1 mile.

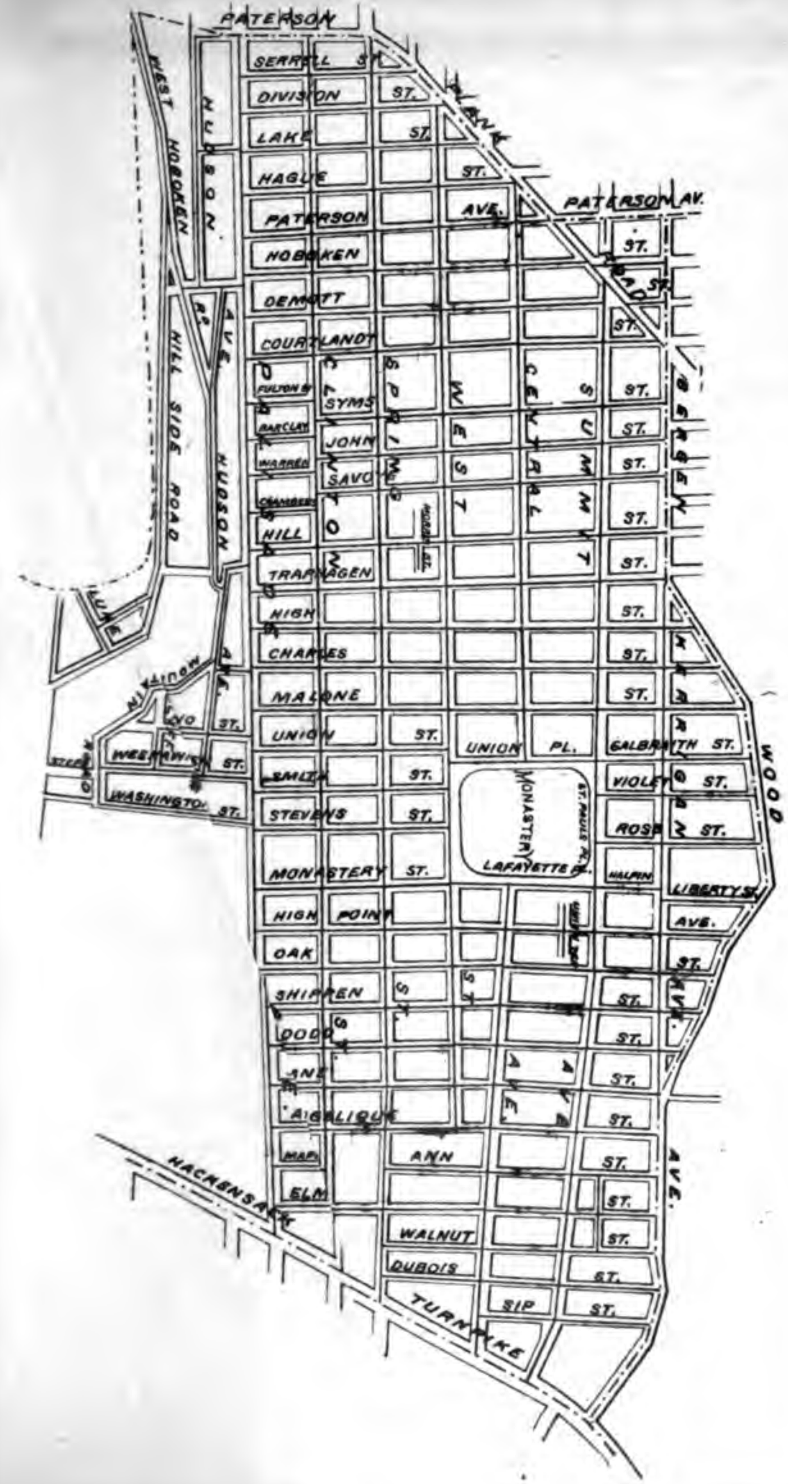
The material generally used, is Belgian pavement with a few exceptions where Nicholson pavement has been used. Lately several miles have been paved with Telford macadam pavement.

The total length of streets unpaved in Jersey City is about 110 miles; in Hoboken, about 11 miles; in Weehawken, about 3 miles.

No paving has been done in either West Hoboken, town of Union, or township of Union.

8. What is the character of the soil?

9. Are the streets unduly wet in the spring of the year?


PATERSON
SERRELL ST.
DIVISION ST.
LAKE ST.
HAGUE ST.
PATERSON AVE.
HOBOKEN
DEMOTT
COURTLANDT
FULTON ST.
SYMS
BARCLAY
JOHN
WARREN
SAVOY
CHAMBERS
HILL
TRAPHAGEN
HIGH
CHARLES
MALONE
UNION ST.
SMITH ST.
STEVENS ST.
MONASTERY ST.
HIGH POINT
OAK
SHIPPEN ST.
DODD ST.
ANE
MAPL
ELM
ANN ST.
WALNUT ST.
DUBOIS ST.
SIP ST.
HACKENSACK TURNPIKE
PLANK ROAD
PATERSON AV.
BERGEN AVE.
WOOD AVE.
WEST HOBOKEN
HUDSON
HUDSON AVE.
HILL SIDE ROAD
PALISADE AVE.
CLINTON
SPRING ST.
WEST ST.
CENTRAL AVE.
SUMMIT AVE.
UNION PL.
MONASTERY
ST. PAULS PL.
LAFAYETTE PL.
GALBRAITH ST.
VIOLET ST.
ROSE ST.
HALPIN
LIBERTY ST.
AVE.
MOUNT
WEEHAWKEN ST.
WASHINGTON ST.
ST.

The soil generally is a tenacious clayey soil.

The streets, where not paved, are unduly wet and muddy in the spring of the year, and when the clayey nature is greatly predominating often becoming almost impassable.

10. How are the roadways constructed?

The carriage-way or roadway is generally rounded off so as to form the segment of a circle, and when simply of earth, the center is formed about 12 inches higher than the surface of the gutter on each side, but when paved it is formed only about 7 inches higher than the surface of the gutter on each side.

11. How much wooden pavement exists?

About 4 miles in Jersey City; none elsewhere.

12. How much stone pavement, cobble-stones, or blocks?

In Jersey City, total pavement about 41 miles; in Hoboken, about 11 miles; in Weehawken, none; in West Hoboken, none; in town of Union, none; in township of Union, none.

13. How much asphalt or concrete pavement; how much Macadam or graveled roadway?

Jersey City, 2 miles of Macadam; town of Union, 1 mile of Macadam; township of Weehawken, 2 miles of Macadam; township of Union, 1 mile of Macadam.

14. What are the arrangements and regulations for cleaning and watering the streets?

15. Are the results satisfactory as to cleanliness of the streets? If not, specify defects.

16. Are shade trees planted along the streets; if so, how arranged and of what kind?

An annual appropriation is made for cleaning the streets in Jersey City and Hoboken, and the contract is let out by competitive bidding.

In the other town and townships the gutters are kept clean by the street commissioner.

The results, where let out by contract, are not generally satisfactory, because it is found that contractors frequently become derelict in th efulfillment of their contract.

No shade trees are planted along the streets, unless by private parties, only excepting around the public squares. They are generally planted about 2 feet from the edge of the curb and sidewalk and about 20 feet apart. They are of various kinds, but largely of maple.

17. Does the asphalt pavement injure the trees?

18. Does gas injure the trees?

19. Do the trees have any direct effect upon health? *e. g.*, ailantus, eucalyptus?

20. Are they cared for by the corporation or by individual property-owners?

No injury has been observed as being specially due to asphalt pavement.

Injury is attributed to gas, but we have not been able to discover special cases.

The beneficial influence of the trees upon health is generally admitted, in absorbing the impurities in the air and giving out only such as are necessary to life.

They are generally cared for only by individual property-owners.

21. How many public parks belong to the city?

22. State the dimensions of each.

23. Are they within the city limits?

There are no public parks belonging to either of the cities, town, or townships.

24. How many open squares within the city limits?

25. What is the area of each?

In Jersey City there are two open squares.

In Hoboken there are two open squares.

There are none other in either of the remaining town or townships.

One of them in Hoboken contains 138,000 square feet and the other 139,500 square feet.

One of those in Jersey City contains 80,000 square feet; the other contains 230,400 square feet.

26. Are the public parks and squares kept in good condition?

27. Are public fountains provided in the parks?

The public squares are kept in fair condition. Both of those in Jersey City contain public fountains, and one of those in Hoboken contains a public fountain.

28. How many public urinals in streets and in parks?

29. Are any areas for and sources of amusement provided in the parks?

30. Furnish copies of any regulations or ordinances relating to care and management of the parks.

There are no public urinals whatever in any of the streets or squares of the cities, nor in any portion of the town or townships.

No sources of amusement are provided.

31. To what extent is life endangered by improper arrangement and management at railroad crossings within the city?

32. How many lives lost from this cause during the last five years?

With one exception, as far as known, all railroad crossings within the city are provided with gates, which are regularly raised and lowered by a flagman to avert danger. In the case of the exception there are only freight trains passing, and these only at long intervals. At those crossings where there are no gates flagmen are stationed. Therefore, as far as ascertainable, no lives were lost from the above cause.

33. What number of accidents occurred last year on street railroads?

34. What number of accidents resulted from efforts to get on or off the front platforms of street-cars?

In Jersey City there were four accidents during the past year; one occurred in Hoboken during the same time. None occurred in either Weehauken, West Hoboken, town of Union, or township of Union.

SCHEDULE F.

Habitations of Hoboken, Weehawken, West Hoboken, town of Union, township of U n.

1. How many dwelling-houses are there within the city limits?

In Hoboken there are 3,000 dwelling-houses; in Weekawken there are a nt 100 dwelling-houses; in West Hoboken there are 910 dwelling-houses; in town Union there are 830 dwelling-houses; in township of Union, about 230 dwelling-ho es.

2. What proportion of these are inhabited by the owners?

In Hoboken about one-third are so inhabited; in West Hoboken and tow f Union about one-half are so inhabited; in Weehawken and township of Union out two-thirds are so inhabited.

3. What is the average occupancy of each dwelling? Specify, when acticable, the rate in different parts of the city.

For Hoboken, about 10; for Weehawken, about 8; for West Hoboken out 6; for town of Union, about 6; for township of Union, about 8.

4. How many are tenement houses—that is, occupied by two or more milies?

In Hoboken about 1,500 buildings are occupied by more than two f lies or tenements.

There are practically no tenements in either Weehawken, West H ken, town of Union, or township of Union.

5. How many houses are overpopulated; give details of locatio nd effects in a special report, if possible?

There are no overpopulated houses in either town of Union, or nships of Weehawken, West Hoboken, or township of Union.

6. Are there any municipal regulations about overpopulation; i what are they?

There are none for Hoboken, Weehawken, West Hoboken, tow Union, or township of Union.

7. Is there any regulation as to the material of which and manner in which houses shall be constructed within the city limits; if so, what i and is it practically enforced?

In Hoboken there is an ordinance regulating the limits within ich no frame buildings shall be built, and when violated a fine is imposed. The no similar restriction in either Weehawken, West Hoboken, town of Union, or nship of Union.

8. Have any houses been condemned as unsafe within t ast year; if so, how many?

One in the city of Hoboken within the last year. None in er of the other places.

9. Have any been condemned as unfit for habitation for r reasons; if so, how many, and for what reasons?

None have been condemned for other reasons.

10. What proportion of the dwelling-houses have conne with the sewers? Of these what proportion are connected by tight drains, with table traps?

In Hoboken, practically, all dwelling-houses have conne n with the sewers.

Even those on the lowlands are generally connected w the sewers, although in many instances such connections are little more than wor s. A few isolated dwellings, entirely without the range of any existing sewer e not connected. There are no connections provided with traps so far as we kno can ascertain.

In the town of Union less than 5 per cent. of all the b ngs are connected with the single sewer which there exists; in Weehawken, 10 pe nt.

West Hoboken and township of Union have practi no sewer connections, and none of those in town of Union are provided with tra

11. Do any houses have springs, cisterns, or wells in basement or cellars for water supply?

In Hoboken a few houses have wells in the cella m which water is drawn for drinking purposes.

In Weehawken, West Hoboken, town of Union, and township of Union the inhabitants rely entirely on this mode of supply, there being no supply from water-works in these places, though the wells, springs, or cisterns are generally located in the back yards, and not in the basement or cellars.

12. What proportion of the dwelling-houses are isolated buildings with sufficient yards or clear space all around them?

In Hoboken there are only five or six isolated buildings with grounds around them. In Weehawken about one-fourth are isolated; in West Hoboken about one-half are isolated: in town of Union about one-half are isolated; in township of Union about two-thirds are isolated.

13. Do you know of any houses in which special arrangements are made for ventilation; if so, give particulars?

In a few in Hoboken separate flues have been provided, through which foul air may pass off. We know of nothing of this kind in any of the other places.

14. Are the cellars and basements in any port of the city damp or insufficiently drained? If so, specify.

The cellars of all the buildings on the low lands in the westerly portion of the city previously referred to are damp and insufficiently drained.

Their elevation, with reference to high water, lack of sewerage, &c., has been described in detail under section D., drainage and sewerage.

15. What proportion of the habitations are furnished with proper bathing facilities?

In Hoboken, about 70 per cent. are so furnished. In Weehawken, West Hoboken, town of Union, and township of Union practically none, there being no water-supply in those places.

16. Are the cellars used for storing fuel? Are ashes and other sweepings from houses deposited in cellars?

The cellars of Hoboken and of the other towns and townships are generally used for storing fuel.

Ashes and other sweepings are generally deposited in ash barrels or boxes in the city of Hoboken, from which they are regularly removed during the week by the carts of the street-cleaning contractor. No such provision exists in either of the towns or townships, and as a result the ashes and sweepings are scattered and filled in in different parts of the grounds, and sometimes of the cellars.

17. Have any diseases occurred which seem to be due to overcrowding or unfitness of dwellings or bad condition of cellars? If so, specify.

Such diseases have occurred in Hoboken, due to great overcrowding of dwellings, in a few isolated cases.

Where many persons have been crowded together in small, low, and ill-ventilated apartments the death rate, particularly among infant children, has been greatly increased.

This applies particularly to Hoboken, there being but few tenement houses in the remaining places under consideration.

18. Does the fuel used have any influence upon health? If so, specify.

It does not.

19. Is the ground under basement floors usually cemented?

No, it is not.

20. Are basements generally wainscotted?

In Hoboken basements are generally wainscotted.

In Weehawken, West Hoboken, town of Union, and township of Union there are far less buildings with basements, and such are generally of a small and inexpensive kind.

These are not always wainscotted, though the better class with basements generally are.

21. What is the height of buildings in comparison with the width of streets?

In Hoboken generally the height of buildings will range between 30 to 50 feet, or an average of about 40 feet, fronting on streets, half of which are about 50 feet in width and half 65 feet in width.

In Weehawken, West Hoboken, town of Union, and township of Union the average height of buildings will be about 25 feet and the average width of streets about 50 feet.

22. Have any ill effects been observed from arsenic paper in sleeping and living rooms?

None have been observed.

SCHEDULE H.

Garbage and excreta of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. What is the law as to the removal of garbage? Furnish copy of law, if possible.

For Hoboken and West Hoboken the law is such that practically the garbage shall be removed by contract. None for Weehawken, town of Union and township of Union.

2. How exactly is the law complied with?

In Hoboken it is complied with.

None to comply with for Weehawken, town of Union, and township of Union.

In West Hoboken it is complied with.

3. Is the kitchen refuse required to be removed in covered vessels?

No such regulation in Hoboken. None for either of the other places.

4. Are the garbage, ashes, &c., removed by the corporation employés or by private contractors?

5. Is this removal at the expense of the corporation or of the householder?

In Hoboken by private contractors, at the expense of the corporation.

No provision for removal in either Weehawken, town of Union, or township of Union.

In West Hoboken by corporation employés, at the expense of the corporation.

6. Where is it taken to?

7. How often is it removed?

8. What is the ultimate disposition made of it?

In Hoboken carted away from the thickly settled portion of the city twice a week in winter and three times in summer.

Ultimately the solid and unobjectionable portion of it is used for filling.

No provision for either removal or ultimate disposition in either Weehawken, town of Union, or township of Union.

In West Hoboken it is removed out of the limits of thickly settled portion once a week and dumped in vacant ground.

9. Are the removal and ultimate disposition promptly and satisfactorily performed?

In Hoboken they are, as also in West Hoboken. No provision in either Weehawken, town of Union, or township of Union.

10. Does any nuisance or probable damage to health result from infrequent removal, improper keeping before removal, improper handling during removal, improper manner or place of deposit, or neglect during any part of the process? Specify minutely.

In Hoboken there does not. None in either of the other places, as far as we have been able to ascertain, from physicians or other public officers.

11. If the removal is at the cost of the corporation, what was its cost during the last fiscal year?

For Hoboken the cost was $940. None for either Weehawken, town of Union, or township of Union. For West Hoboken the cost was $312.

12. If at the cost of the householders, give estimated aggregate cost to them for the same period.

It was at cost of corporation for Hoboken and West Hoboken. None that could be estimated for either of these other places.

13. What disposition is made of dead animals?

In Hoboken they are removed by contract. In Weehawken, West Hoboken, town of Union and township of Union, the privilege of carting away dead animals is accorded to a single contractor without remuneration other than that derived from the carcass.

14. What number of dead animals of different kinds were so disposed of during the last year?

In Hoboken about 250. In Weehawken about 20. In West Hoboken about 14. In town of Union about 25. In township of Union about 15.

15. Is the matter of disposal satisfactory; if not, why not?

In Hoboken it is satisfactory. It is satisfactory for Weehawken, West Hoboken, town of Union, and township of Union.

16. What is the number and proportion of houses of which the kitchen and laundry waste water is delivered into cess-pools on the premises?

None in Hoboken. Practically all in Weehawken, West Hoboken, town of Union, and township of Union.

17. Are these cess-pools tight or porous, or what proportion of each?

None in Hoboken. All porous in Weehawken, West Hoboken, town of Union, and township of Union.

18. Are they furnished with overflows; if so, to what extent, and where does the overflow deliver?

None in Hoboken. Practically none in Weehawken, West Hoboken, town of Union, and township of Union.

19. To what extent is the flush tank used, and in what manner?

None in Hoboken, Weehawken, West Hoboken, town of Union, and township of Union.

20. To what extent are absorption drains under the surface of the soil used?

None in Hoboken. Practically none in Weehawken, West Hoboken, town of Union, and township of Union.

21. Where cess-pools are used, what proportion of them receive the waste of water-closets?

None in Hoboken. None in Weehawken, West Hoboken, town of Union, and township of Union.

22. What are the regulations and methods with regard to constructing and cleansing cess-pools?

None in Hoboken, with regard to constructing and cleansing cess-pools. Nor in Weehawken, West Hoboken, town of Union, or township of Union.

23. Are the methods in use satisfactory; if not, why not?

None in Hoboken. As far as their nature will permit in Weehawken, West Hoboken, town of Union, and township of Union; but the methods are defective.

24. What proportion of houses have water-closets?

In Hoboken about three-fourths have water-closets. Very few, practically none, in Weehawken, West Hoboken, town of Union, and township of Union.

25. What proportion of these deliver directly to a public sewer?

In Hoboken about nine-tenths of these deliver directly into a public sewer. A very small proportion in Weehawken, and town of Union practically none. None in West Hoboken and township of Union.

26. What proportion to cess-pools?

None to cess-pools in Hoboken. Practically none in Weehawken, West Hoboken, town of Union, and township of Union.

27. What proportion of the houses depend wholly or partly on privy vaults?

In Hoboken about one-half depend wholly or partly on privy vaults. Practically all in Weehawken, West Hoboken, town of Union, and township of Union.

28. What proportion of the privy vaults are water tight?

Practically, none in Hoboken. None in Weehawken, West Hoboken, town of Union, and township of Union.

29. What are the regulations and methods with regard to constructing and cleansing such vaults?

For Hoboken there are no regulations with regard to construction. Ordinance limits cleansing to be done by licensed scavenger, between 11 p. m. and 3 a. m.; and provides manner of doing and nature of carts, so as to avoid nuisance from smells, &c.

Ordinance for town of Union provides that no privy shall be built nearer than within 3 feet of the line of an adjoining owner, nor of 10 feet of the street line; and that they shall be cleaned between 11 p. m. and 4 a. m. Same for township of West Hoboken.

There are no ordinances for either in Weehawken or township of Union, they being incorporated under the general State law.

30. Have any cases occurred of contamination of wells or cisterns by privy or cess-pool drainage? If so, give particulars or references, especially where the matter has been carefully investigated.

None in Hoboken or Weehawken, West Hoboken, town of Union, or township of Union; although analyses are rare.

31. To what extent is the dry-earth system used?

None in Hoboken, Weehawken, West Hoboken, town of Union, and township of Union.

SCHEDULE K.

Slaughter-houses and abattoirs of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. From what part of the country are animals obtained for the markets?

From the West, North, and South.

2. How many are annually slaughtered for the city in which you reside?

For the city of Hoboken about 6,000 beeves are annually slaughtered and about 15,000 small stock, including hogs, calves, sheep, and lambs.

3. How are they conveyed to the place at which they are slaughtered?

By railroad transportation.

4. Are means adopted, by legislation, or otherwise, for supplying food, water, air, and exercise to animals while in transit?

There are. They are required to be so supplied every 28 hours.

5. Are animals, when sent to market, submitted to inspection before or after slaughtering?

They are not.

6. Are they washed before being killed?

They are not.

7. Can you give any observations as to the effect of terror in animals producing

changes in secretions or flesh, whereby their milk or meat is rendered injurious as food?

The following answers to questions 7, 8, 9 are the result of observations by Mr. Jas. C. Corlies, D. V. S., in answer to a communication addressed to him by General Sterling:

8. What is the effect upon their flesh for the market of depriving animals of food and drink for twenty-four hours, provided this be a day or two before they are killed; or, secondly, immediately before they are killed?

To deprive animals of food and drink for a period of twenty-four hours immediately preceding their slaughter, would not, in our opinion, produce any deleterious effect upon the meat, but, as is too often the case, animals are loaded, or rather packed, in close cars so that they cannot lie down and are required to stand without either food or water for four or five days, and are then unloaded at a place of slaughter and killed in an hour afterwards, and while laboring under an intense degree of excitement.

The same physiological and pathological phenomena would exist, as has already been described.

If the consumers of beef could witness the long trains of cars loaded with the cattle which, being brought from the West and required to stand on sidings, often a whole day at a time, and hear the lowing and moaning of the poor suffering brutes for the luxuries to them of food and water, such a hue and cry would go up as would soon create some legislative action upon the subject. So long as that state of affairs is allowed to exist, just so long must we expect to have meat wholly unfit for human consumption to go upon the market.

9. What diseases, and what stages of disease, in animals have been observed as rendering their flesh injurious as food?

All diseases that are accompanied by acute febrile symptoms in the first stages, as well as those that are characterized by prevalent collections, which are afterwards absorbed into the circulatory system, will render the flesh unfit for human consumption, to wit: An animal being required to stand in an open car for a long time without food or drink, becomes, in consequence, debilitated, which renders it susceptible to contract colds, which is a common term for catarrh, whether gastric, nasal, intestinal, or any other form, inflammation supervenes, which often assumes a gangrenous nature, strumous diseases follow, and in consequence the system will soon become loaded with effete materials which permeate the flesh. This condition may be present either in the first or acute, or in the second or chronic stage.

10. What is the mode of slaughtering?

Of two kinds: either by striking in the head or by cutting their throats.

11. Are they kept from seeing the various processes and results of butchering?

They are not.

12. What disposition is made of bodies of animals that die in transit?

They are brought to the terminus of the road and then immediately rendered.

13. Can you give any statistics of the number of animals and quantity of meat condemned yearly, and why condemned?

No; we cannot.

14. Are abattoirs erected at public or private expense?

At private expense.

15. Is the establishment of abattoirs and the business of slaughtering governed by legislative action, State, or municipal?

By both State and municipal.

16. Is the business of slaughtering concentrated in large establishments or scattered in small?

17. Are they within or beyond the city limits?

It is concentrated in large establishments lying within the city limits.

18. Do the abattoirs drain into covered sewers or open sewers flowing through a part of the city?

Into covered sewers unless they drain directly into the river.

19. Are abattoirs considered as nuisances in the neighborhood? If so, for what reasons?

They are not.

20. If a system of abattoirs is adopted in your city, what facilities are offered to butchers for slaughtering?

Very good and complete facilities.

21. How does the profit to the butcher, under the new system, compare with that under the old?

It is greater under the new system.

22. What rents are paid by them?

On an average about $50 per month by each butcher for his stall for slaughtering.

23. What disposition is made of the fats, tallow, blood, and animal refuse?

They are sent outside of the city for rendering and fertilizers.

24. Is the refuse of abattoirs given to hogs, kept for the purpose? If so, what regulations protect the public from consequent nuisance?

It is not.

25. How does the meat of these hogs compare with those which have been corn-fed?

No comparison.

26. Is the "rendering" of the animal refuse done on the day in which animals are slaughtered?

Generally it is.

27. Is any method of cooling the meat employed?

It is always cooled by being exposed to the fresh air.

28. Give such facts, pamphlets, papers, or references as may bear on these subjects.

None could be obtained other than what are included under the headings of this class.

SCHEDULE L.

Manufactories and trades of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. Are there any manufacturing establishments within the city limits, or in the suburbs, which are nuisances, such as distilleries, chemical works, tanneries? If so, specify.

There are not.

2. Are any restrictions imposed upon such by law?

The law provides for the abatement of any nuisance.

3. Are there any which pollute the water supply; if so, how?

There are not.

4. Have any bad results followed?

There have not.

5. Are there any which produce noxious gases or vapors? If so, specify, and state results.

The odors arising from the few scattered slaughter-houses, just south of the southerly boundary of Hoboken, are always offensive, and during the warm seasons almost unbearable.

6. Are there any which produce disease in the workmen? If so, specify.

There are not.

7. Are women employed in the manufactories? If so, are they subject to any diseases due to their occupation, as from the use of sewing-machines, &c.? If so, specify.

Women are employed, but they are not subject to any diseases due to occupation.

8. What are hours for labor and meals in factories?

Hours are from 7 a. m. to 12 m., and from 12.45 p. m. to 6.15, and close at 3 p. m. Saturdays.

9. Are children employed in factories? If so, what are their hours of labor?

No children are employed.

10. What is the age of the youngest so employed.

None employed under fourteen years.

11. Does it affect their health? If so, specify.

It does not.

12. Is there any law regulating hours for labor of children, or requiring children employed to go to school a portion of the year? If so, furnish a copy of such.

There is not.

13. Are the cubic space and ventilation in the rooms occupied by workmen generally satisfactory?

They are.

14. Have any diseases (or impaired physical condition) been observed, due to insufficient air supply to the workmen?

There have not.

15. Are the arrangements for privies and water-closets to these establishments satisfactory? If not, why not?

They are.

SCHEDULE M.

Public school buildings of Hoboken, Weehawken, West Hoboken, town of Union, township of Union.

1. How many public school buildings are in the city?

Four in Hoboken, 1 in Weehawken, 1 in West Hoboken, 1 in town of Union, 1 in township of Union.

2. Are they properly located? If not, why not?

Two are and two are not, in consequence of unhealthy locality and unfavorable surroundings. The others in Weehawken, West Hoboken, and town of Union, and township of Union are properly located.

3. Give for each building the following data: Location, altitude and area of sight, nature of soil, character of drainage, material, date of erection, cost, number of stories, and number of rooms used as school rooms.

For location and altitude of each of the buildings refer to topogrophical and sanitary map upon which the buildings have been plotted and the elevations shown. Upon this map all existing sewers have also been shown, and it will thus appear whether the drainage is by sewers or surface drainage only. For number of stories and number of rooms used as school rooms, see the ground plans under section 4. The school buildings in Hoboken and West Hoboken are brick buildings, while those in Weehawken, and town of Union, and township of Union, are frame buildings.

4. Give a floor plan for each floor, no matter how rough, if precise dimensions and height of each story is stated. Indicate all windows, doors, heating apparatus, and the number and position of scholars' desks, giving floor area and cubic space for each pupil.

5. How is the building heated?

In Hoboken they are all heated by stoves excepting one by steam, also the one in West Hoboken by steam. All the others by stoves.

6. What is the mean temperature of the rooms when the school is opened, and half an hour before closing, in cold season?

About 68° at opening and about 75° half an hour before closing.

7. What is the mean external temperature for the same hours?

Probably varying between 30° and 45°.

8. Is any sickness traceable to variations or extremes of temperature?

Nothing more than occasionally slight disorders or headaches.

9. How much fuel is required annually to heat the building?

The four in Hoboken require about 60 tons each. One in West Hoboken about 75 tons. Town of Union about 50 tons, and Weehawken and township of Union about 30 tons each.

10. How are the school rooms ventilated in winter?

Generally by opening windows and also by ventilating flues. In school No. 4 in Hoboken, however, cold-air-flues are provided which contribute largely to the more effectual ventilation.

11. How are the school rooms ventilated in summer?

Same as in winter.

12. Is the ventilation satisfactory?

Generally it is not.

13. Give analysis of air during school hours, if possible.

Cannot be obtained.

14. What are the water-closet and privy arrangements?

They are generally in the yards in the form of privies, in all the schools connected with the sewers in the streets.

15. Are they satisfactory; if not, why not?

Generally they are not satisfactory, because the offal collects instead of being carried away.

16. Is the basement used for water-closets, earth-closets, for storing wood, or for what purpose?

Generally for storing wood and coal. In school No. 4 in Hoboken it contains steam boiler and heating apparatus, also janitor's quarters. Used now, also, for playground in stormy weather.

17. Is the basement ventilated separately from the rest of the building?

Generally it is not. In school No. 4, in Hoboken, it is.

18. What is the water supply?

In Hoboken, from water works; otherwise, from wells or pumps.

19. Is it abundant?

It is.

20. Please send results of latest analysis; if not analyzed, please state your opinion of its quality.

In Weehawken, West Hoboken, town of Union, and township of Union, generally the water derived from wells and springs is of good quality. In Hoboken, also, the water derived from the Passaic River is generally of good quality excepting occasionally during the summer months, when it becomes turbid and discolored at times.

21. What patterns of desks and seats are used?

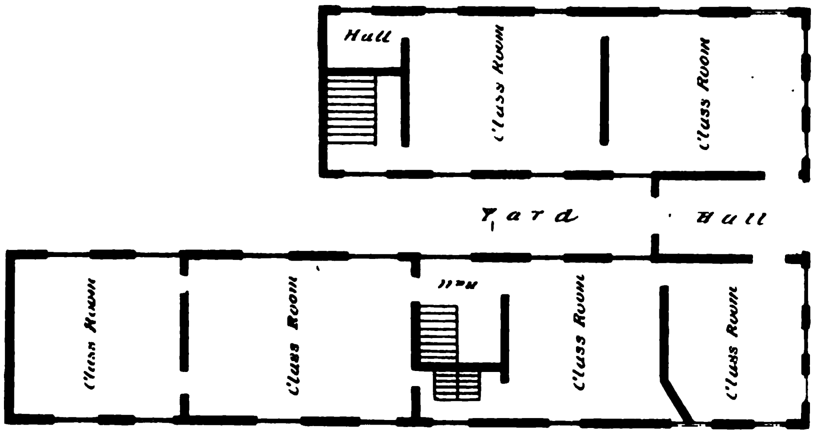
Every style from the earliest to the latest is in use. One of the latest in use in No. 4 school in Hoboken is the "Peard desk," which is considered a good design (folding seat and desk).

22. Are they satisfactory?

The latest is satisfactory. The older, which constitutes the majority is, in many cases, extremely unsatisfactory.

PUBLIC SCHOOL No. 1.

HOBOKEN, N.J

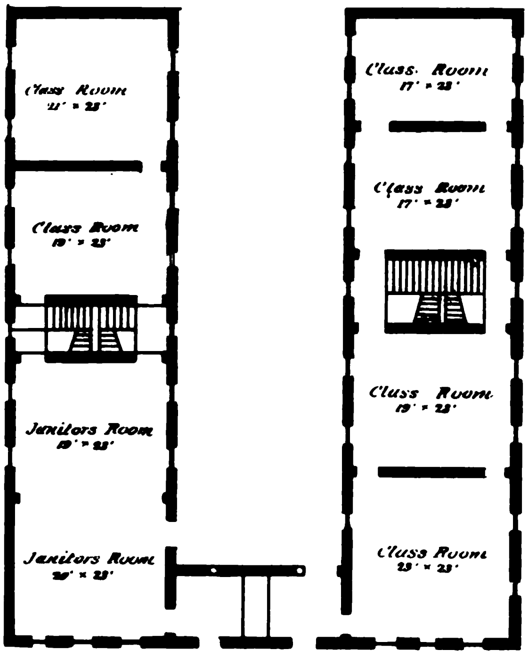


FIRST FLOOR

Erected 1855.
Cost $ 10.000

PUBLIC SCHOOL Nº 2.

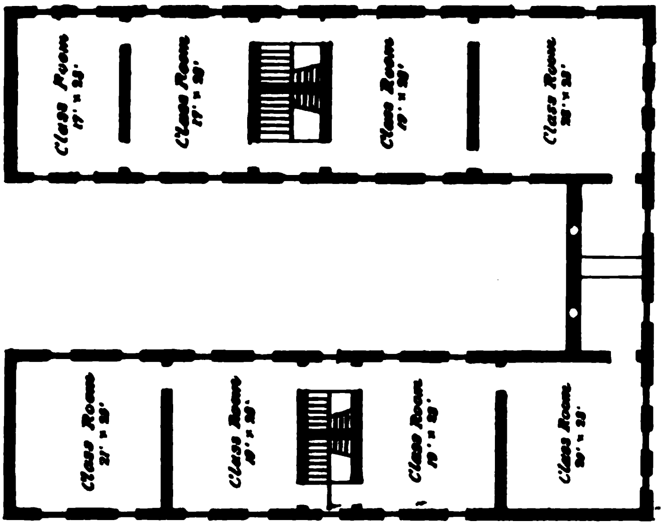
HOBOKEN, N.J.



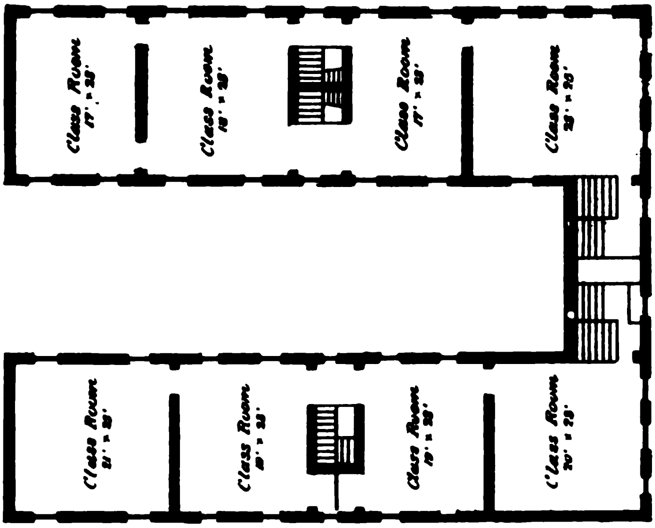
FIRST FLOOR

PUBLIC. SCHOOL No. 2.

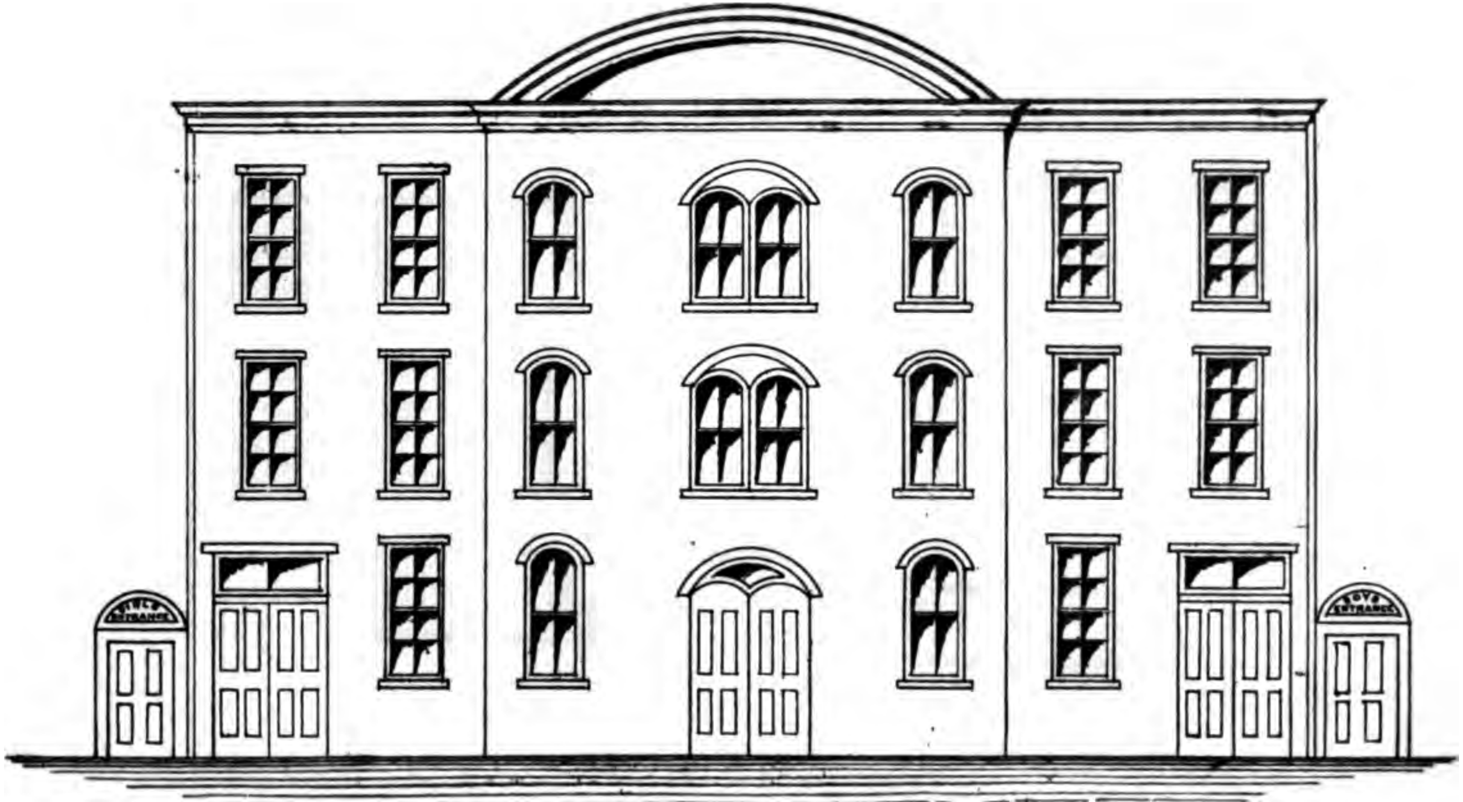
HOBOKEN, N.J.



SECOND FLOOR



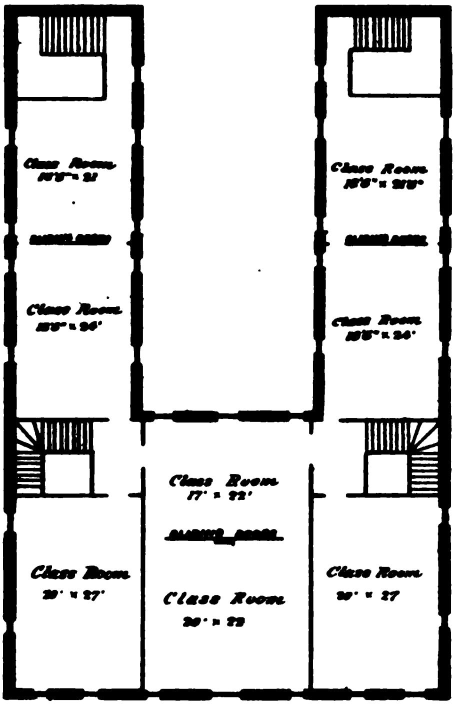
TOP FLOOR



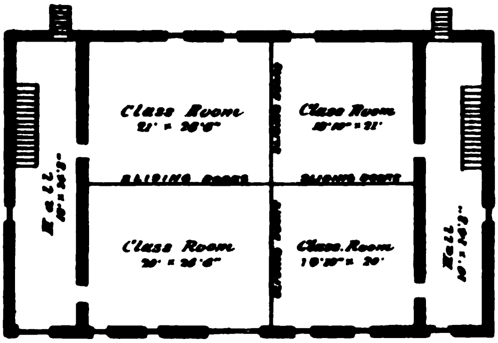
PUBLIC SCHOOL No 8

PUBLIC SCHOOL No. 3.

HOBOKEN, N. J.



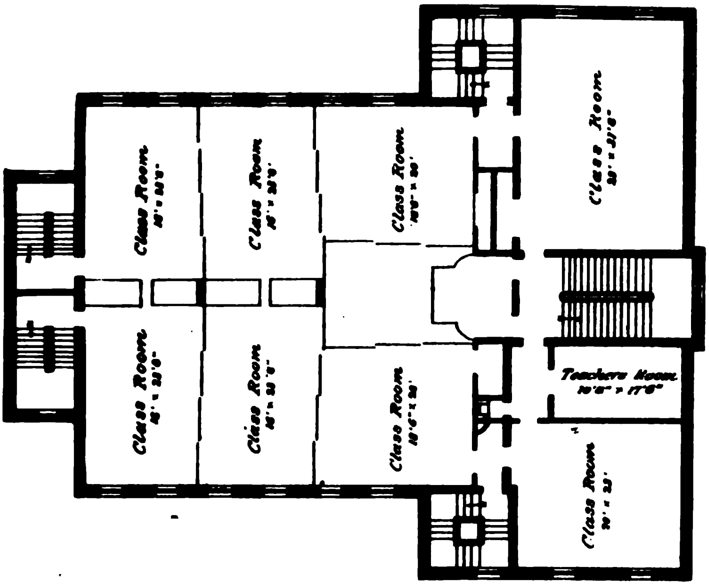
FIRST FLOOR



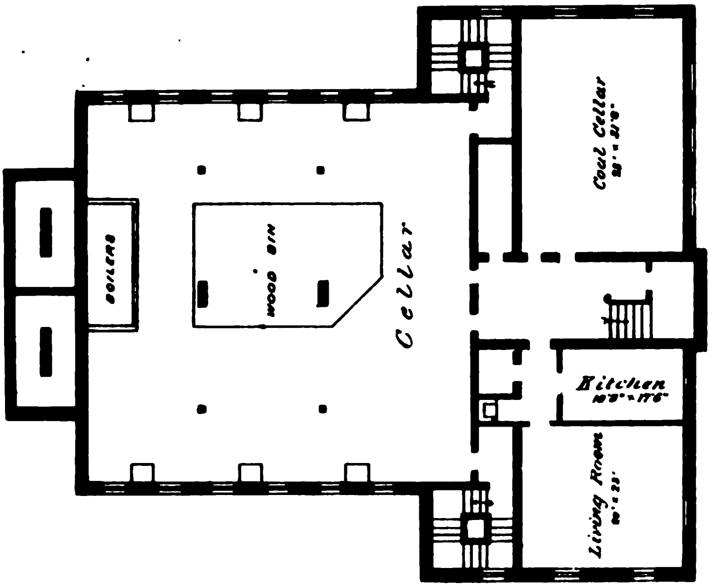
SECOND FLOOR

PUBLIC SCHOOL No.4

HOBOKEN, N.J.



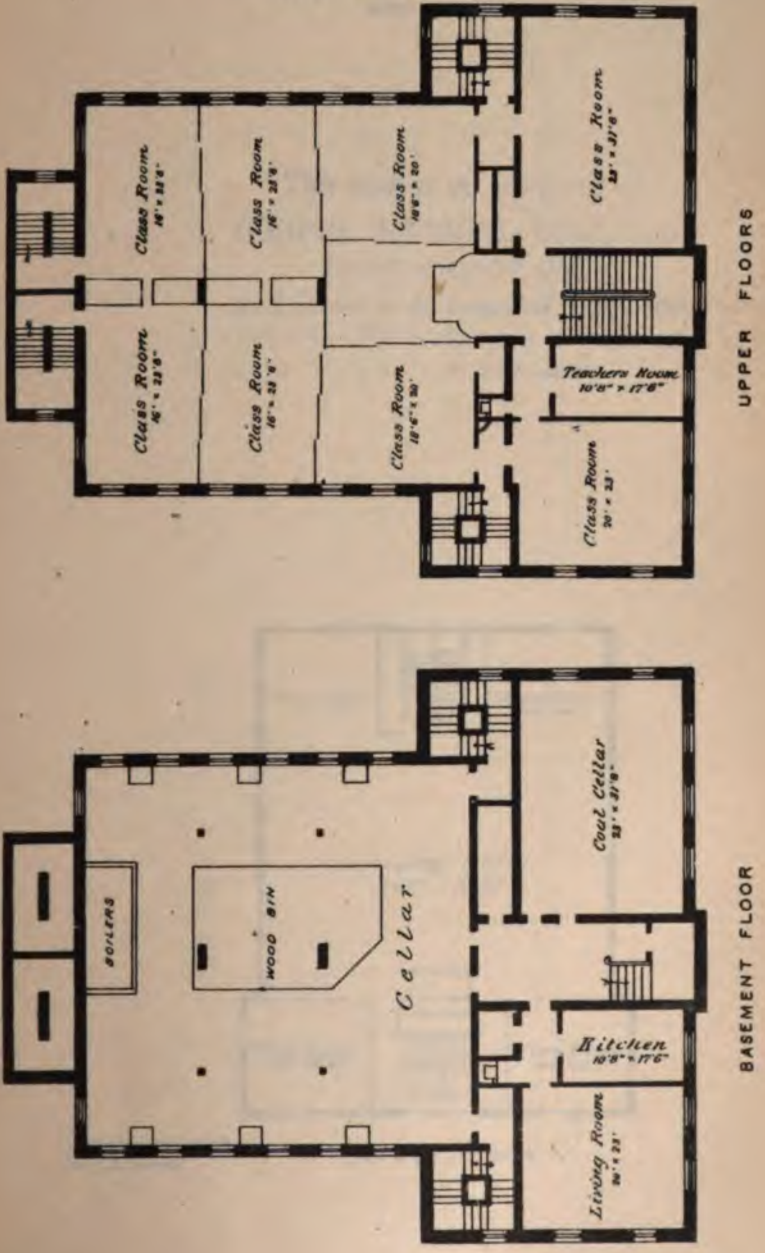
UPPER FLOORS



BASEMENT FLOOR

PUBLIC SCHOOL No. 4

HOBOKEN, N.J.

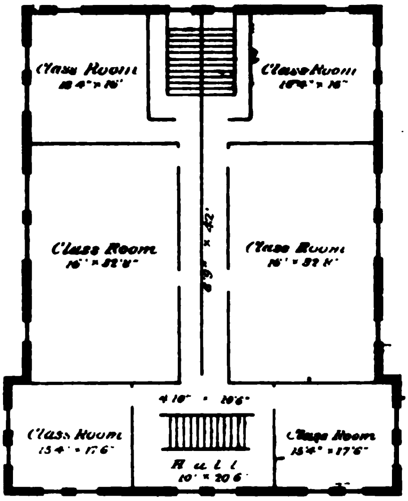


UPPER FLOORS

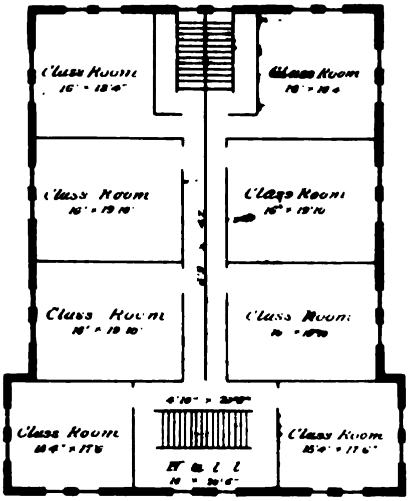
BASEMENT FLOOR

PUBLIC SCHOOL

WEST HOBOKEN N J



THIRD FLOOR



TOP FLOOR

23. Are the school rooms sufficiently light?

The majority are not sufficiently light. School No. 4 in Hoboken is, except in cloudy weather.

24. What is the number of square feet of surface through which light passes into each room by windows?

About 44, 66, 88, and 110 square feet, according to variable size of rooms and height of windows.

25. Distance of the pupils at recitations from the blackboard, maps, or charts on which they are expected to read letters or figures?

From 5 feet to 25 feet.

26. Do the classes stand or sit during recitation?

They usually sit during recitation, but at times they also stand.

27. Give a programme of each school day showing division of the time to the several studies, recitation, recesses, and intermissions?

PUBLIC SCHOOL NO. 4, HOBOKEN, N. J.

Order of exercises for first class—female department.

MONDAY.

	Min.		Min.
A. M.—Arithmetic, 9.15 to 10.05	50	P. M.—Spelling, 1.05 to 1.35	30
German, 10.05 to 11.00	55	Geography, 1.35 to 2.15	40
Writing, 11.00 to 11.40	40	Grammar, 2.15 to 2.50	35

TUESDAY.

A. M.—Arithmetic, 9.15 to 10.15	60	P. M.—Algebra, 1.05 to 1.40	35
Spelling, 10.15 to 10.45	30	Grammar, 1.40 to 2.15	35
Geography, 10.45 to 11.15	30	Reading, 2.15 to 2.50	35
History, 11.15 to 11.40	25		

WEDNESDAY.

A. M.—Arithmetic, 9.15 to 10.05	50	P. M.—Spelling, 1.05 to 1.35	30
German, 10.05 to 11	55	Grammar, 1.35 to 2.15	40
History, 11 to 11.40	40	Algebra, 2.15 to 3	35

THURSDAY.

A. M.—Arithmetic, 9.15 to 10.05	50	P. M.—Spelling, 1.05 to 1.35	30
German, 10.05 to 11	55	Geography, 1.35 to 2.15	40
Writing, 11 to 11.40	40	History, 2.15 to 2.50	35

FRIDAY.

A. M.—Arithmetic, 9.15 to 10	45	P. M.—Algebra, 1.05 to 1.35	30
Grammar, 10 to 10.45	45	Reading, 1.35 to 2.20	45
Geography, 10.45 to 11.45	30	History, 2.20 to 2.50	30
Spelling, 11.15 to 11.40	25		

Course of studies, seventh class, female department.

9 to 9.15 a. m.—Assembly; reading of Bible; singing.

9.15 to 10 a. m.—Roll-call; reading of answers to examples worked at home; examples worked in the class; dictation of examples for home work.

10 to 10.30.—Reading and writing of numbers; mental arithmetic; multiplication and division tables; Roman numbers.

10.30 to 10.55—Marching.

10.55 to 11.30—Spelling; dictation; object lessons.

1 to 1.45 p. m.—Reading; preparing the next day's reading.

1.45 to 2.30 p. m.—Copying from books; writing short abstracts of previous reading lessons; penmanship.

FRIDAYS.

11 to 11.30 a. m.—Speaking.

1 to 1.45 p. m.—Drawing of mathematical figures.

1.45 to 2.30—Assembly; singing; speaking.

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 1, divisions A and B.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.10 o'clock	10 minutes	Bibellesen and register.
10.00 o'clock	50 minutes	Lesen.
10.30 o'clock	30 minutes	Orthography.
11.15 o'clock	45 minutes	Recess and schreiben.
11.50 o'clock	35 minutes	Grammatik and dictation.
12.00 o'clock	10 minutes	Schluss and aufgaben.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes	Opening, study, reading.
2.30 o'clock	30 minutes	Geography.
3.00 o'clock	30 minutes	Arithmetic.
3.30 o'clock	20 minutes	Writing.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

FREDERICK SHAEFER AND OTTO ORTEL, *Teachers.*

ENGLISH DAY.

Town of Union public schools, room 1, divisions A and B.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9 00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 minutes	Writing.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes.	Opening, study, geography.
2.30 o'clock	30 minutes	Grammar.
3.00 o'clock	30 minutes	Arithmetic.
3.30 o'clock	20 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

OTTO ORTEL, *Teacher.*

ENGLISH DAY.

Town of Union public schools, room 2, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.15 o'clock	35 minutes	Writing.

AFTERNOON

1.30 o'clock	10, 20, and 20 minutes.	Opening, study, geography.
2.30 o'clock	30 minutes	Grammar.
3.00 o'clock	30 minutes	Arithmetic.
3.30 o'clock	30 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

JENNIE S. CURREY, *Teacher.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 2, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	30 minutes	Reading.
9.40 o'clock	20 minutes	Study.
10.00 o'clock	50 minutes	Writing, recess.
10.50 o'clock	40 minutes	Geography and grammar.
11.30 o'clock	30 minutes	Arithmetic and dismissal.

AFTERNOON.

1.30 o'clock	5 minutes	Register.
1.35 o'clock	40 minutes	Lesen.
2.15 o'clock	30 minutes	Orthography.
2.45 o'clock	30 minutes	Schonschreiben.
3.15 o'clock	35 minutes	Grammatick.
3.50 o'clock	10 minutes	Schluss und Aufgaben.

Months of March and April, 1880.

J. CURREY AND F. SCHAEFER, *Teachers.*

ENGLISH DAY.

Town of Union public schools, room 3, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	25 minutes	Spelling.
11.15 o'clock	35 minutes	Writing.

AFTERNOON.

1.30 o'clock	10, 20, and 30 minutes	Opening, study, geography.
2.30 o'clock	40 minutes	Grammar.
3.10 o'clock	40 minutes	Arithmetic.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

JAMES E. WHITE, *Teacher*.

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 3, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.

ENGLISH DAY.

Town of Union public schools, room 4, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	35 minutes	Spelling.
11.20 o'clock	30 and 10 minutes	Writing and dismissal.

AFTERNOON.

1.30 o'clock	10 minutes	Opening.
1.40 o'clock	40 minutes	Arithmetic.
2.20 o'clock	25 minutes	Study.
2.45 o'clock	30 minutes	Grammar.
3.15 o'clock	30 minutes	Geography.
3.45 o'clock	10 and 5 minutes	Giving out lessons and dismissal.

Months of March and April, 1880.

MARY A. BROWN, *Teacher.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 4, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 and 30 minutes	Opening and reading.
9.40 o'clock	20 minutes	Spelling.
10.00 o'clock	30 and 20 minutes	Arithmetic and recess.
10.50 o'clock	25 minutes	Geography.
11.15 o'clock	20 and 15 minutes	Grammar and writing.
11.50 o'clock	7 and 3 minutes	Giving out lessons and dismissal.

AFTERNOON.

1.20 o'clock	5 minutes	Register.
1.25 o'clock	40 minutes	Lesen.
2.15 o'clock	30 minutes	Orthography.
2.45 o'clock	30 minutes	Schonschreiben
3.15 o'clock	35 minutes	Grammatick.
3.50 o'clock	10 minutes	Schluss and Aufgaben.

Months of March and April, 1880.

M. BROWN AND FRED. SCHAEFER, *Teachers.*

ENGLISH DAY.

Town of Union public schools, room 5, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	40 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 and 10 minutes	Writing and dismissal.

AFTERNOON.

Time.	Length.	Recitation.
1.30 o'clock	10, 20, and 25 minutes.	Opening, study, language.
2.25 o'clock	5 and 15 minutes	Recess.
2.45 o'clock	45 minutes	Arithmetic.
3.30 o'clock	20 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

L. M. LYCETT, *Teacher.*

GERMAN AND ENGLISH DAY.

Town of Union public schools, room 5, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	10 minutes	Opening exercises.
9.10 o'clock	50 minutes	Reading.
10.00 o'clock	30 minutes	Spelling.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	20 minutes	Dictation.
11.10 o'clock	40 minutes	Writing and dismissal.

AFTERNOON.

Time.	Length.	Recitation.
1.30 o'clock	10, 20, and 25 minutes.	Opening, study, arithmetic.
2.25 o'clock	5 and 15 minutes	Recess.
2.45 o'clock	45 minutes	Reading.
3.30 o'clock	20 minutes	Language.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

H. GOOS AND L. M. LYCETT, *Teachers.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room, 6, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	15 minutes	Scriptures, roll-call.
9.15 o'clock	25 and 10 minutes	Reading, study.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 and 10 minutes	Language and dismissal.

AFTERNOON.

1.30 o'clock	10 and 45 minutes	Opening, reading.
2.15 o'clock	5 and 15 minutes	Recess.
2.45 o'clock	15 minutes	Spelling.
3.30 o'clock	20 minutes	Writing.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

C. SAFT AND H. M. GOOS, *Teachers.*

ENGLISH DAY.

Town of Union public schools, room 6, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	15 minutes	Scriptures and roll-call.
9.15 o'clock	35 minutes	Reading.
9.50 o'clock	40 minutes	Arithmetic.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Spelling.
11.20 o'clock	30 and 10	Arithmetic and dismissal.

AFTERNOON.

1.30 o'clock	15, 20, and 20 minutes	Roll, study, language.
2.25 o'clock	5 and 25 minutes	Recess, reading.
2.45 o'clock	45 minutes	Arithmetic.
3.30 o'clock	20 minutes	Spelling.
3.50 o'clock	10 minutes	Dismissal.

Months of March and April, 1880.

CLARA L. SAFT, *Teacher.*

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 7, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	25 minutes	Devotions and roll.
9.25 o'clock	35 minutes	Reading.
10.00 o'clock	15 and 15 minutes	Language and preparation for recess.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	30 minutes	Writing.
11.20 o'clock	20 and 20 minutes	Spelling and dismissal.

AFTERNOON.

Time.	Length.	Recitation.
1.30 o'clock	25 minutes	Roll and study.
1.55 o'clock	25 minutes	Arithmetic.
2.20 o'clock	10 minutes	Preparation for reces.
2.30 o'clock	15 minutes	Recess.
2.45 o'clock	55 minutes	Reading and spelling.
3.40 o'clock	20 minutes	Dismissal.

Months of March and April, 1880.

H. GOOS AND L. CURREY,
Teachers.

ENGLISH DAY.

Town of Union public schools, room 7, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	25 minutes	Devotions and roll.
9.25 o'clock	35 minutes	Reading.
10.00 o'clock	15 and 15 minutes	Arithmetic and preparation for recess.
10.30 o'clock	20 minutes	Recess.
10.50 o'clock	10 minutes	Arrangement for work.
11.00 o'clock	20 15, and 20 minutes	Spelling, language, and dismissal.

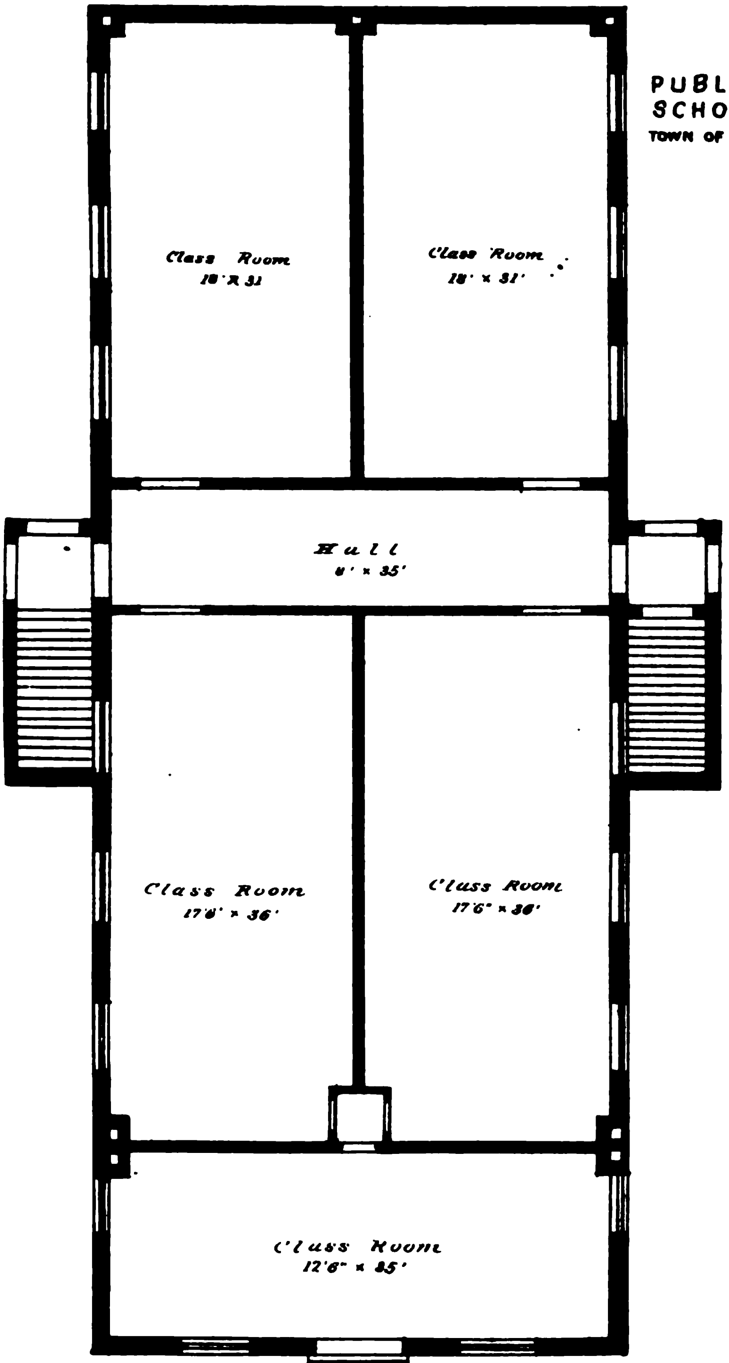
AFTERNOON.

Time.	Length.	Recitation.
1.30 o'clock	20 minutes	Roll and study.
1.50 o'clock	30 minutes	Arithmetic.
1.20 o'clock	10 minutes	Preparation for recess.
2.30 o'clock	15 and 30 minutes	Recess and reading.
2.15 o'clock	25 minutes	Spelling.
33.40 o'clock	20 minutes	Dismissal.

Months of March and April, 1880.

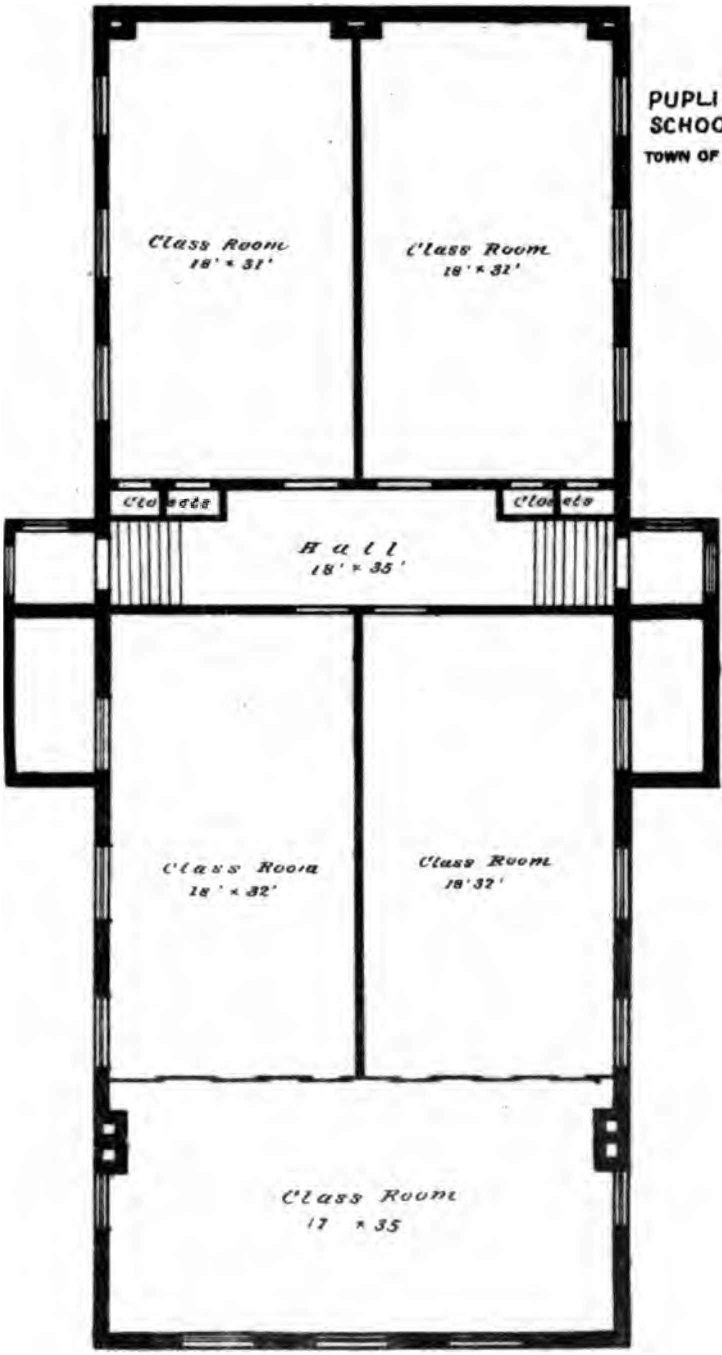
L. CURREY, *Teacher.*

PUBLIC
SCHOOL
TOWN OF UNION



FIRST FLOOR

PUPLIC
SCHOOL
TOWN OF UNION



SECOND FLOOR

ENGLISH AND GERMAN DAY.

Town of Union public schools, room 8, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	30 minutes	Order, scriptures, and roll-call.
9.30 o'clock	20 and 5 minutes	Reading and exercise.
9.55 o'clock	25 and 10 minutes	Spelling and preparation for recess.
10.30 o'clock	20 and 5 minutes	Recess and preparation for work.
10.55 o'clock	25 and 5 minutes	Arithmetic and exercise.
11.25 o'clock	20 and 15 minutes	Reading and dismissal.

AFTERNOON.

Time.	Length.	Recitation.
1.30 o'clock	25 minutes	Opening and roll.
1.55 o'clock	25 and 10 minutes	Reading and preparation for recess.
2.30 o'clock	15 and 10 minutes	Recess and preparation for work.
2.55 o'clock	25 minutes	Writing.
3.20 o'clock	10, 10, and 15 minutes	Language, counting, dismissal.

Months of March and April, 1880.

HENRIETTA GOOS,
LIZZIE LYCETT,
LIZZIE CURREY, AND
CLARA SAFT,
Teachers.

ENGLISH DAY.

Town of Union public schools, room 8, division 1.

Daily programme.

FORENOON.

Time.	Length.	Recitation.
9.00 o'clock	30 minutes	Order, scripture, and roll-call.
9.30 o'clock	20 and 5 minutes	Reading and exercise.
9.55 o'clock	25 and 10 minutes	Spelling and preparation for recess.
10.30 o'clock	20 and 15 minutes	Recess and preparation for work.
10.55 o'clock	25 and 5 minutes	Arithmetic and exercise.
11.25 o'clock	20 and 15 minutes	Reading and dismissal

AFTERNOON.

Time.	Length.	Recitation.
1.30 o'clock	25 minutes	Opening and roll.
1.55 o'clock	25 and 10 minutes	Reading and preparation for recess.
2.30 o'clock	15 and 10 minutes	Recess and preparation for work.
2.55 o'clock	20 and 5 minutes	Spelling and exercise.
3.20 o'clock	25 and 15 minutes	Arithmetic and dismissal.

Months of March and April, 1880.

CLARA SAFT,
LIZZIE LYCETT, AND
LIZZIE F. CURREY,
Teachers.

28. How long are all the pupils under eight years old confined? 1st. In the room 2d. To the seat without change?

1st. Two hours and 30 minutes, with the privilege of going out. 2d. Change work about every 20 or 30 minutes.

29. Is your experience in favor of two sessions a day with one long intermission, or only one session with recess?

For primary, intermediate, and grammar grades, two sessions; for high school, one session.

30. Are there opportunities for pupils to exercise, sheltered from the cold, heat, or wet, and without exposure to air contaminated by privy or water-closet?

The West Hoboken school has such a room in the basement; none of the others have.

31. Are there opportunities for drying clothes when wet coming to school?

There are not.

32. If any lessons are studied outside of the school hours, mention the subject so studied, the average time required for the study of each, and the time of day usually devoted thereto?

All grades above the primary are expected to study at home. They usually have three subjects occupying one-half hour each, and to which they usually devote themselves in the evening. The time ranges generally from 30 minutes to 3 hours.

33. Give the actual length of time devoted each day to outdoor exercise and recreation, the number of holidays or half holidays in each week, the time of year at which the vacations occur, and the number of days in each vacation?

School opens at 9 a. m. and 1 p. m. Primary department dismissed at 11.30 a. m. and 2.30 p. m. Grammar department dismissed at 11.45 a. m. and 3 p. m.

The outdoor exercise it is impossible to fix, excepting that in case of boys it is ample. One regular holiday in each week, Saturday; vacation occuring in July and August, averaging about eight weeks in Hoboken and all the other places. One week at Christmas. No attendance on Saturday or Sunday and on regular legal holidays.

34. Describe the play-grounds; give the area thereof, and describe the gymnastic and calisthenic apparatus, if any used.

There are generally no play-grounds. No gymnastic and calisthenic apparatus is used.

35. Is exercise in the open air a compulsory feature of the institution?

It is not.

36. Is competition a feature in the system of instruction?

Generally it is not; in some exceptional instances it is.

37. If so, state fully to what extent it governs the award of prizes, whether different classes or both sexes may compete for the same prize; in this connection, state whether the sexes study and recite together or not.

Generally no prizes are awarded. Both sexes do not in Hoboken; in the other places they do study and recite together.

Stevens institute scholarships are awarded to the pupils gaining the highest record in the high school. In the high school they also recite together.

38. Is corporeal punishment permitted in the school?

Prohibited by State law and by the regulations governing the school.

39. What methods of correction are used?

Appeal to the feeling of honor of the pupil and detention after school hours; extra lessons are often required and reports made to parents.

40. Mention what measures are taken for the care of the grounds, the flushing or other cleaning of sewers, the removal of excreta, &c.

As previously mentioned, none of the schools have what may be called grounds around them, but merely back yards in which the privies are located. Where they have privies not connected with any sewer they are cleaned out as often as they become filled, and during warm seasons disinfectants are used. The sewers are not specially flushed other than derived from rains and the water wasted by house owners.

41. A copy of all regulations and statistics should accompany each report.

42. If statistics of the age, height, and weight of the pupils in each school or class are obtainable, they are important.

They cannot be obtained.

43. Are there any statistics respecting the illnesses and deaths of teachers and pupils?

There are not.

44. Please state the results of your observations, experiments, and records respecting the prevalence of the following-named diseases, and of any others of like character, and of the effect of the school-room furniture and building in promoting or modifying them:

a. Abnormitiis and diseases of the eye (short-sight, color blindness, &c.).

b. Diseases resulting from cerebral congestion (headache, epistaxis, goitre, &c.).

The following are the results of observations by one of our most experienced principals in Hoboken. He says:

"While I am not prepared to give figures showing the number of those affected with diseases of the eye, yet I am convinced that great injury is done to the eyes in the schools. Short-sightedness and weak eyes prevail largely. Two causes I would name: 1st. The light is not properly received upon black-boards and upon books, &c. Instead of the pupil seeing by reflected light, he is often required to receive the direct rays upon the page of his book, &c.

2d. Much of the printed matter in our books is in too small type for close and continuous reading.

3d. Our copy-books are made with red lines—these are entirely too intense. I mean intensity of red light upon the eye is weakening even to a fully developed one, but to the eye of the boy or girl under the nervous energy required for the growth of the body and for carrying on its functions, it is more damaging."

c. Diseases of the spine (scoliosis, &c.).

d. Diseases of the respiratory organs (consumption, scrofula, &c.).

e. Diseases of the digestive organs (dyspepsia, &c.).

f. Diseases of the genito-urinary organs (especially females).

g. Contagious and epidemic diseases.

h. Wounds, injuries, &c.

We have consulted the oldest practitioners in our city on the foregoing questions affecting the health of pupils and teachers of our public schools, and they express themselves as unwilling to furnish such information in a definite form, without having first made a special study of the subject under investigation, extending over a period of several years.

The prevailing opinion among them, however, appears to be that the public schools generally are not specially detrimental to the health of either pupils or instructors, and that they cannot trace any of the diseases above named as having originated in the schools.

45. Give your experience as to the effect of large schools on the propagation of disease, and as to the advisability, in a sanitary point of view, of very large school buildings of several (three or more) stories in height.

From the fact that the classes are always separate and distinct from one another, increasing the number is not considered as necessarily injurious.

46. State the frequency of heart disease among anæmic and debilitated pupils who occupy the upper floor of school buildings, and compare with the frequency among such pupils occupying the first and second stories only.

None have been observed by physicians, though many of the oldest practitioners have been consulted.

47. State facts respecting the frequency of short-sight among the pupils of the several ages and grades, and as to effect of defective light and improperly constructed desks and seats, on this disease, and on the production of spinal curvature, &c.

In the opinion of an experienced instructor and principal, the condition of light and the habits of closely applying the eyes to the book in reading, and also much slate work, particularly the white on the black, proves injurious to the sight.

48. Give your observations as to the safety of competition between pupils of both sexes; also as to the advisability of identical school hours, sessions, and lessons for both sexes.

Competition occasionally is good, but when carried to excess proves injurious. In the opinion of an experienced instructor, co-education in the above respects is both advisable and beneficial.

SCHEDULE Q.

Cemeteries and burials.

In describing the cemeteries of the towns and cities upon the Hudson River and New York Bay water front of Hudson County, I shall take them *seriatim*, beginning with the most northerly and thence proceeding successively southward. Those cities and towns lying upon the Hudson River and New York Bay contain within their limits all the cemeteries of the county, being eleven.

NORTH BERGEN TOWNSHIP.

In this township we find four cemeteries, viz, Machpelah, Grove Church, Hoboken, and Weehawken. In nearly all cases personal examinations were made regarding the cemeteries of the county.

***Machpelah Cemetery.*—It should be stated, that in all cases I have taken the word**

decay, as applied to the body of a deceased person, to mean the total disappearance of all except the osseous portions of the body. Machpelah Cemetery contains about —— acres, of which two acres are occupied. The land was first used for burial purposes in the year 1850. It is situated upon the westerly slope, the ridge which runs through Hudson County from north to south, and which in this township rises from 220 to 260 feet above mean high-water. Trap rock underlies at varying depths all of the ridge. There are in the cemetery 2,500 graves. Interments are now made at the annual rate of about 100. Owing to a sparse population in this vicinage and to the steep descent of hill to the marshes, securing the effectual drainage of the cemetery, I do not regard it as probable that the subsoil drainage contaminates springs, wells, or water-courses. The graves average six feet in depth. The western slope of the hill is covered throughout to a considerable depth by a deposit of loose drift, consisting of gravel of foreign origin intermixed to some extent with the soil of the hill; at this particular point it is a yellowish earth, loose drift gravel, with considerable sand in pockets, the rock sloping to the west. The sand is always reached in about one-half of the cemetery before a depth of six feet has been attained. This soil, when dry, is hard and compact, and difficult to dig; it is dry at the depth at which a body is placed. There are no vaults. Four feet of earth must cover all bodies. The superintendent is unable to speak with any great degree of certainty as to the time required for bodies in graves to decay, but thinks about four years would be a sufficient length of time. No deleterious or unpleasant effects have been observed to proceed from the cemetery, and no complaints have been made. Bodies of persons who have died from contagious diseases must be inclosed in sealed cases.

Hoboken Cemetery.—Situated in North Bergen Township, on westerly slope of ridge. First used in 1862. From that time to 1879, November 10, there have been 5,000 burials, including about 400 bodies removed from old cemetery. Yearly average, 294 burials. No probable contamination of springs, wells, or water-courses by subsoil drainage. The graves average 6 feet in depth and are dry; the surface water running off freely to the avenues, thence being conveyed by stone gutters out of the grounds, and finally reaching the creeks or river (Hackensack). All bodies must be covered by at least 3 feet of earth. The soil resembles that of the last-described cemetery, a gravelly, fairly tenacious earth. There are four vaults (ventilated), brick interiors, stone exteriors, sunk in side of hill, and dry. Floors are two cement and two flagged. As regards rapidity of decay, the superintendent, Mr. Crane, found it impossible to speak positively, but had frequent proof that bodies were preserved much longer in damp than in dry soils. The grave-diggers were also uncertain upon this point. Thought about eight years in vault and in sandy soil would have to elapse before decay would be complete. No unsanitary effect has been traced to this cemetery. Bodies of persons who have died of contagious diseases are not allowed in the vault. There is no receiving vault. Cement floor. No complaints concerning it have been made. No odor from it is perceptible unless one places himself in proximity to the ventilating shaft.

Grove Church Cemetery.—Situated in North Bergen Township, on the westerly side of ridge. It was first used in 1847. It contains about —— graves; burials take place to the number of about 150 a year. There is no evidence that springs, wells, or water-courses are contaminated by the subsoil drainage. The graves are of an average depth of about 5 feet and are dry. The soil characteristics are about like those of the former two cemeteries. There are two vaults, used occasionally, one of brick, the other of stone. No information of any account as to rapidity of decay of bodies in vaults or graves could be obtained. There has not been observed any evil effect from the cemetery. The population of township is very sparse; at this point about 123 persons to 100 acres. "Extra precautions," as to the character of which I am not informed, are taken in the case of the burial of bodies of persons who have died from contagious diseases. There is a receiving vault, against which no complaints have been heard.

Weehawken Cemetery.—Weehawken Cemetery lies in North Bergen Township near the western foot of the slope. Was first used for interment purposes in 1858, since which time there have taken place about 11,000 burials at an annual rate of about 600. There is no probability, owing to the distance of dwellings from the cemetery and to the fact of their being nearly all situated on the upper portion of the slope above the cemetery, of any contamination of springs, wells, or water-courses. All drainage flows directly into the salt meadow or marsh, and thence is conveyed by creeks to the river. The graves average about 6 feet in depth. Soil, as in the former-described cemeteries, is a yellowish earth, fairly compact, and interspersed with gravel. There are places in which I am informed at a depth of about 20 feet a quicksand is met with. Examination of several open graves revealed the fact that they were perfectly dry. There is one public and one private vault built of brick and cement. The public vault is ventilated. The superintendent thinks about four years' time would suffice for the complete decay of a body in the vault. In the graves the time required would vary with the soil according as it was dry or wet, sandy or porous, or clayey and tenacious. In the dry and porous soils from one to three years will insure complete decay, while in the more moist and heavy earths a much longer period would have to elapse. A case was mentioned of the body of a very stout man, which was exhumed after being twelve years in the moist earth, and found to be in a condition of perfect preservation. The superintendent remarked that on an average about one year in sandy and a year longer in clayey soil would result in the complete decay of a body. In heavy or rainy weather a heavy odor is perceptible about the cemetery. The only precaution taken in case of burial of bodies dead from contagious diseases is that the bodies of those who have died from small-pox are not allowed to be deposited in the vault. There is one receiving vault, ventilated. Bodies are retained as long as not offensive. At least 4 feet of earth must cover all bodies, this including mound.

The next cemeteries are within Jersey City, which contains six, viz: The Jersey City Cemetery, Speers Cemetery, Dutch Reformed Cemetery, Methodist Cemetery, Hudson County Catholic and St. Peter's Cemetery.

Jersey City Cemetery.—First used for interment purposes in 1830. Situated on easterly slope of the hill, overlooking the densely-populated portion of Jersey City, from which it is separated by a marshy tract of about one-quarter of a mile in width, which is in process of filling up to street grade with street and house refuse, covered in part by stagnant pools, and in summer partially grown over with aquatic reeds, locally known as cat's-tail (of the genus *typha*, I believe), and by a rank marshy vegetation. The cemetery contains from 12,000 to 14,000 bodies; a more exact enumeration is difficult, if not impossible. The subsoil drainage flows to a stone receiving wall at the extreme east of the cemetery, and thence must percolate to the marshy meadow below, there to lie until absorbed by the earth or evaporated. One well, supplying a number of families, is sunk at the foot of the hill below the cemetery. The graves vary from 6 to 11 feet in depth; the latter depth is where the land has been covered by filling, to bring it up to grade. The soil varies somewhat; the greater portion being made up of loam (filling) and argillaceous sand, imposed upon trap rock very deep down in most parts of the cemetery. The graves are dry. Stone vaults are used. As to decay of bodies in the vaults, the superintendent, whose experience covers a period of forty years, informs me that generally a body has lost offensiveness in one year, while three years would not be sufficient time to insure a total disappearance of certain of the tendinous portions of the body. In the graves the rapidity of decay varies with the soil. Bodies in the more tenacious and clayey portion have been exhumed after twelve years' time had elapsed, and found to be not completely decayed. (See some experience of superintendent Weehawken Cemetery.) In the more sandy and porous soil three years would be a sufficient length of time to reduce bodies to the condition which in the closer and more impervious soil required twelve years. Bodies in loamy soils would become inoffensive to the sense of smell in about three years, while an unpleasant odor might be detected from a body which had lain twelve years in clay. Inquiries in the neighborhood failed to elicit any complaints against the cemetery. Small-pox and typhoid fever are the only contagious diseases in the case of which special precaution is taken. Bodies of persons dying from such diseases are not allowed in the public vault. No such rule is enforced with reference to the depositing of such bodies in private vaults. There are two receiving vaults, one of them full and its further use abandoned. One new vault, 50 feet square, has taken the place of the old one. At present the vault is so managed as not to become a nuisance. I should perhaps state, while upon this subject, that in the summer of 1878 much unfavorable comment was excited by a very unpleasant odor which appeared to come from the old vault. Inspection was made by President Elder, of the county board of health, who reported on October 2, 1878, as follows:

"The grounds outwardly present a good appearance. The public vault * * * lies deeply buried in the earth, its only aperture tightly closed by an iron door. It has no means of lighting or ventilation. The interior is capacious, gloomy, and wet. In this dark cavern rest the remains of many bodies. * * * The condition of the wooden coffins exemplifies every gradation from soundness to complete decay. A few have been renovated, while others have been permitted to crumble until they are disgusting to the sight; two or three exposing their dead. This is, perhaps, a fair type of the public receiving vaults of all cemeteries. The custom of retaining bodies in vaults after decomposition has taken place is deeply to be deplored."

The report goes on to suggest, as a preventive of these unpleasant sights and the deleterious effects resulting from the impregnation of the atmosphere with the gases produced by the decomposition of the bodies, that "all bodies intended to be kept in vaults should be inclosed in air-tight metallic cases"; also that "cemeteries should be removed far from human habitations". It is only fair to say that the cemetery authorities, upon the agitation alluded to above, and influenced doubtless by the foregoing expression of opinion, together with appropriate action taken by the Jersey City board of health, promptly remedied the then existing condition of the public vault, since which time no nuisance has been observed."

Speers' Cemetery.—This cemetery is situated in Jersey City, in the suburban portion, upon the summit of the ridge, which rises to an altitude at this point of about 120 feet. The soil may be described as loam above, and red shale, retentive of moisture; trap rock, nearly level, from 15 to 18 feet below the surface, easterly trend; cemetery situated on inside slope of trap basin. The interments aggregate about 40 per annum. There are three wells situated within a radius of about 200 feet of the cemetery. The graves average 6 feet in depth. The soil is dry at the depth at which a body is placed, except in the spring and winter. There are three private vaults and one public receiving vault. Two of the private vaults are covered over with earth, excepting when opened for the reception of a body. The other private vault is closed by a tightly fitting iron door. The private vaults have about 144 square feet of floor room each, with an altitude of ceiling of 8 feet. The receiving vault is closed with an iron door, and has a floor space of 288 square feet and a height of 8 feet. The private vaults are one of stone and two of brick. The receiving vault is of brick. Three feet of earth, at least, must cover all bodies; this does not include the height of the mound. In the vaults a body would decay in about three or four years; not much odor after one or two years had elapsed. In the graves in dry and porous soil a body would not give off an unpleasant odor after a year's time. In three or four years nothing but dry bones would remain.

Mr. Speer, the owner of the cemetery, remarked that after twenty years they would be able to use the land a second time for burial purposes, as all traces of bodies would have disappeared. In heavy, wet earth the decay of a body would be prevented or retarded for an indefinite time. No complaints against this cemetery have come to my knowledge. The remains of those who have died of scarlet fever or small-pox are not allowed in the receiving vault, and must be buried at least 6 feet below the surface of the earth. The receiving vault is of brick, and sunk in the earth, which at this point is inclined to be sandy. The floor is of uncemented brick, laid loosely. The deliquium resulting from putrefaction is thus allowed to find its way through the interstices between the bricks, and is absorbed by the underlying soil. Chloride of lime is used constantly in the vault. Only three bodies have been placed in the vault in the last six months, and no complaints of its management have been made.

The superintendent, Mr. Speer, while upon the subject of vaults, remarked that vaults should, in his opinion, be built in sand or very dry and porous earth. The floor should allow of the absorption by the earth of the liquid products of decomposition; hence cement or close floors should be avoided, as, with such, the liquids would collect, and upon the doors being opened the stench would be overpowering.

Dutch Reformed Cemetery.—This cemetery is situated in that portion of Jersey City formerly Bergen, and is contiguous to the last-described (Speer's) cemetery. The population is suburban, lodged in middle and first-class dwellings, and surrounds the cemetery, which is one of the oldest in this part of the State, the church to which it belongs having been in existence for over two hundred years. There are about two and three quarter acres of land in the cemetery, only about two acres of which are now in use. There are at least four wells in the neighborhood of the cemetery, one about 50 feet south, one about 150 feet north, and two at the eastward, 100 and 250 feet respectively. The graves average 6 feet in depth, and by rule of the cemetery all bodies must be at least 4 feet from the surface of the ground. As to the soil, my own observation is that all the soil hereabouts is an earth of a pretty compact and firm consistence, slightly interspersed with small stones. The soil is dry at the depth at which a body is placed. There are thirteen vaults; nine of these are closed with earth, three are made in the manner of catacombs, and one is closed with the ordinary iron door. They are all of brick and cement; nine have gravel and four cement floors. It is difficult to obtain categorical answers to questions as to rapidity of decay. The sexton informs me that the bodies of fleshy persons decay more rapidly than those of persons of a spare habit of body. Bodies of those dying of scarlet fever and diphtheria disappear more rapidly than those of persons dying of other diseases.

No complaints have been made against the cemetery. I have seen, upon the zymotic disease maps of Mr. Edlow W. Harrison, that the rate of death per 1000 is notably high in this neighborhood. This, however, might be attributed to the fact that, until about a year ago, this section of the city has had very inadequate drainage facilities. No extra precautions are taken in the case of persons who have died of contagious diseases. There is no receiving vault.

Methodist Church Cemetery.—This cemetery is to be found in that portion of Jersey City formerly Greenville. It was first used for interment purposes in 1845. It contains about 250 graves at the present time. Interments take place to the number of about 15 per annum. It is not likely that the subsoil drainage of the land containing graves contaminates springs, wells, or water-courses. The graves average about 4½ feet in depth. The soil is an argillaceous sand, topped with loam. The rock about 20 to 30 feet below. The graves are dry. There are no vaults, all bodies must lie at least 3 feet below the surface. No exhumations have been made; hence no information as to the rate of decay of a body was obtained. No complaint of any unpleasant odor arising from the graves, or of any evil effect, has been made. Extra precautions (character of which not stated) are taken in the case of the burial of persons who have died of contagious diseases. There is no receiving vault.

New York Bay Cemetery.—This is in area the most extensive in the county, containing about 70 acres, and was first used in 1849. It contains about 20,000 graves and the average annual interments is 762. It does not appear at all likely that the subsoil drainage of this cemetery contaminates springs, wells, or water-courses, as the slope of the land is towards the New York Bay with few intervening dwellings. The average depth of a grave is about 6 feet, and the top of all coffins must lie at least 3 feet below the surface of the earth. The soil is in some parts loamy and in others it consists of argillaceous sand. In the greater part of the cemetery the soil is dry. The western half is in the spring of the year inclined to be spongy. There are three public receiving vaults and two private vaults, of brick, with stone fronts. As to rapidity of decay in the vaults I was informed by a number of grave diggers, who at my request held a convention to consider the subject, that complete decay, leaving only the osseous portions of the body, would take ten years time, but that the remains would lose odor in two years.

Touching the rate of decay in the graves I have to record two opinions, that of the superintendent that all flesh will have disappeared in two years; that of the grave diggers that in ten years nothing would remain but bones; that all odor will have disappeared in two or three years in dry and in six to seven years in wet soils. I am inclined to give weight to the opinion of the superintendent, who is a man of habits of close observation.

No complaints have been made of any deleterious effects upon the public health having been traced to this cemetery. When necessary, disinfectants are used. The three receiving vaults are swept clean once a week and fresh sand then put upon the floor. In hot weather carbolic acid is sprinkled about.

Hudson County Roman Catholic Cemetery.—Situated near the foot of western slope of ridge in Jersey City, formerly Bergen. The number of graves and annual interments I have been promised. Have written many times, but owing to the secretary of the cemetery being engaged in a legal conflict of great moment to him, I have been unable to ascertain these points. There is no likelihood of contamination of springs, wells, or water-courses. The nearest house is from 300 to 400 yards distant, and the slope of the land is towards the marsh and creeks. Seven feet is about the average depth of graves. The soil, except in the extreme western portion, is dry. The characteristic is argillaceous sand and gravel, occasional pockets of sharp sand. There is one vault of brick and cement. No information as to rapidity of decay therein. In the graves the diggers think from five to six years are required to insure complete decay. No extra precautions as to contagious diseases. One receiving vault and not complained of.

St. Peter's Cemetery.—Situated in Jersey City on western slope of hill near cuttings of Erie tunnel and Delaware, Lackawanna and Western Railroad, which make of the land a peninsula almost surrounded with deep cuttings. Cannot give number of graves or annual interments for reason stated in case of former described cemetery. No likelihood of contamination of springs, wells, &c., by subsoil drainage. The graves average 7 feet in depth. The cemetery is situated on a bank of argillaceous sand, not much gravel except at a considerable depth. The soil is of necessity very dry. There are three vaults, all of stone. No knowledge on the part of the attendants as to rate of decay therein. In the earth from five to six years would be necessary. The same men work in this as in the former described cemetery, hence the concurrence of the opinions as to rapidity of decay. There is no evil effect from the vault or cemetery, and the former has never been complained of as being in a condition deleterious to health.

Constables Hook Cemetery, situated in Bayonne City.—Constables Hook Cemetery consists of two parts, the old cemetery and the new. The former has been closed for years, and the ground is now leveled. It is said that the first white male interred in these parts was buried here. In the new cemetery there is one private vault, which has not been opened for many years. The slope of the land is to the bay, the nearest dwelling is about 500 feet distant to the landward of the cemetery, and I do not think it likely that there results from this cemetery any contamination of springs, wells, and water-courses. Six and 5 feet are the different depths of the graves. The soil is argillaceous sand. The soil at the depth at which a body is placed is perfectly dry, no springs, no top-soil, nothing but sand. No vaults. Not less than 3 feet must cover all bodies. No information obtainable as to rapidity of decay of bodies. No complaints have been made against the cemetery or the vaults.

Respectfully,

C. J. ROONEY, JR.,
Clerk Board of Health and V. S., Hudson County, N. J.

SCHEDULE R.

Public health laws, regulations, municipal officials.

NORTH BERGEN TOWNSHIP.

There is no system of sewerage. Owing to its sparse population there is not greater likelihood of contamination of public or private water supply than in the case of ordinary rural neighborhoods. The clerk of the township furnishes the information that he does not know what ultimate disposal is made of organic waste, garbage, &c. The township committee has power (under act of 1871) "to declare what shall be considered nuisances within said township, and to cause the same to be abated and removed, and to regulate the manner of abating and removing."

UNION TOWNSHIP.

No sanitary organization. The clerk complains very much of malarial diseases, due, in his opinion, to the adjacent undrained marshes.

WEEHAWKEN TOWNSHIP.

No board of health or other sanitary organization. Under the general State law, township committee can abate nuisances.

TOWN OF UNION.

There is no local health organization. The town council has by charter the right to define nuisances, and to abate, and to set forth the manner of abatement. (See act of State Legislature approved March 27, 1874.)

WEST HOBOKEN TOWNSHIP.

No sanitary board. On complaints being made, township committee has power to abate a nuisance. Can remedy defective drainage, if injurious to surrounding property. No control of contamination of public or private water supply (so clerk reports). On complaint, committee can take cognizance of the condition of cesspools and privy vaults. Committee removes all ashes and garbage. It has power of keeping the streets clean. No control over methods of burial; none over the ultimate disposal of night-soil, &c. May, on complaint made, take cognizance of the fouling of adjacent water-courses. No control over small-pox cases by law; control assumed without legal authority in case of an epidemic. No power to remove such case to hospital. Vaccination not compulsory.

HOBOKEN CITY.

No health board; board of councilmen have a committee on health. A health warden under control of committee on health, and who is also city physician, is appointed. His authority extends over the city; he is annually appointed by the city council. The powers of the health warden are defined by ordinance. Nuisances are defined by ordinance, and abatable by either the health warden or the street commissioner. The health warden and also the street commissioner are by ordinance bound to take every possible measure to ascertain every nuisance in the city, and to cause such nuisance to be removed. Defective drainage should be discovered by the health warden, and corrected by his order. Defective sewerage correction seems to be more peculiarly the province of the street commissioner and the committee on sewers. The prevention or removing the cause of contamination of the public or private water supply appears to be a power incident to the office of health warden. I have not been able to find any specific grant of such powers. The street commissioner and health warden may (in fact are bound to) take cognizance, with or without complaints being made, of the condition of cess-pools and privy vaults, and are also bound to abate any nuisance resulting from the bad condition of such places. Garbage is removed in corporation carts, subject to regulations of street commissioner, who must give notice of days of such removal, at which times ashes and filth may be placed in the streets to be taken away. The commissioner also has general supervision of street cleaning. The county board of health and vital statistics takes charge of matters pertaining to interments. The ultimate disposal of night soil and organic waste is regulated by the council. Nothing can be dumped within the city limits or at the water front. Such matters are taken away by scow. Small-pox cases are taken charge of by the county board of health. Ordinances give to health warden power to send to hospital any person sick with a contagious disease if he (the warden) deem it necessary. For the reason that there is but one hospital for contagious diseases in the county, and that under control of the Hudson County board of health, the power of ordering persons to be taken to such hospital is only exercised by that board. Vaccination is not compulsory. The council and health warden have general powers to restrict the spread of contagious diseases. The matter of vital statistics is the particular charge of the county board. The health warden and street commissioner report to the council; the report is published in the minutes of the proceedings of the council.

JERSEY CITY.

The board of health of Jersey City is the committee on health of the board of police commissioners, which, by charter, is entitled "The Board of Health of Jersey City." The board meets once a month. The powers of the health department of Jersey City are exercised within the corporate limits of said city. The board of health was organized May 1, 1871, under the provisions of the city charter. The present ordinances are contained in "rules and regulations of the health department of Jersey City," adopted September 2, 1872. The number of members is six and their term of office one year. No salary is attached to their duties as members of the board of health. No member of the board is necessarily a physician. There is attached to the board an executive health officer who is not necessarily a physician; he is appointed annually by the board of police commissioners, and, together with six city physicians, constitutes the whole sanitary force of the board. He has no assistants, except when there are detailed police officers for that purpose. The inspector may, without complaint made, make such inspections as he may deem necessary, and I am informed that such inspections, of his own accord, are made by the inspector. An annual inspection, under the supervision of the health officer, is by ordinance directed to be annually made. The board of police are bound to detail such a number of men, not otherwise engaged, as may be necessary to effectually perform such inspection. The powers of the board are derived from the State, and are defined in the city charter. These powers are had independent of any other municipal body. The board may make ordinances forbidding the doing of such acts as are in its opinion injurious to the public health, and has power to provide rules for the sanitary government of the city generally. These rules may be enforced by the board at all times by the collection of penalties recoverable under provisions of the act organizing the local government of Jersey City, passed March 31, 1871. If, upon the annual inspection mentioned before, any street be found in a condition dangerous to health, or in an unpleasant condition, it becomes the duty of the health officer to report the facts to the street commissioner, or to the chairman of the committee on streets and sewers of the board of public works.

I do not find any specific grant of power touching the contamination of the public or private water supply to be lodged with the board of health. It is possible that cognizance would be taken of a complaint made, and that spontaneous action might be had on the occasion of the annual or other sanitary surveys.

The removal of garbage is controlled by the board of public works. The board of health, through its inspector, exercises a general supervision of the streets as to cleanliness, and if found to be in a condition of filthiness, and liable to cause disease, the inspector must report such fact to the committee on streets and sewers of the board of public works. The board of health has general powers as to interments, but this matter is usually left to the regulation of the Hudson County board of health and vital statistics.

Burial within the city limits (except in those cemeteries in existence at the time of passage of the ordinance) was forbidden in 1871. This ordinance, practically, only prevents the establishment of new cemeteries.

Night soil is taken by licensed scavengers and deposited in a scow at the public dock. When full the scow is towed to Amboy by the contractor, and the contents there converted into a fertilizing agent. The board, in its rules (see section 14), implicitly claims the right of removing to hospital persons sick with contagious or infectious diseases, provided the attendant physician considers such course necessary. Generally this matter is attended to by the members of the Hudson County board of health and vital statistics.

Vaccination is not compulsory; there are no rules concerning it. In the case of the breaking out of a contagious disease, a sign is affixed to the house where the patient is located, indicating the nature of the disease. Upon removal, recovery, or death of the person sick, the house, clothing, and bedding are fumigated and cleaned, or, if thought necessary, the clothing and bedding are destroyed. The inspector shall report to the board the value of such property so destroyed.

The keeping a registry of vital statistics is entirely the province of the Hudson County board of health. The births, deaths, and marriages become matters of record according to the rules and regulations of the same board (which follow). The Jersey

City board of health makes no report. The city physicians report quarterly to the board of health.

HUDSON COUNTY (AT LARGE).

Hudson county includes within its boundaries the cities of Jersey City, Hoboken, and Bayonne; the towns of Harrison and Union; and the townships of Kearney, Union, North Bergen, West Hoboken, Weehawken, and Guttenberg, in all, three cities, two towns, and six townships. There is a board of health known as the "Board of Health and Vital Statistics of the County of Hudson," whose authority is coextensive with the area of the county. This board was organized in 1874 by the provisions of "An act to provide for a board of health and vital statistics in the County of Hudson and to prevent the spread of disease." (Copy of ordinances herewith transmitted, marked Schedule R.) The board consists of three physicians, two of whom are known as health commissioners; the third is the county physician, who is a member *ex officio*. All are appointed triennially by the board of chosen freeholders of Hudson County. The county physician as member of the board receives no salary; the other members receive $500 each per annum. The board has no health officer of its own, but commands the services of all health officers of the cities and towns, without their being entitled to extra compensation. The board does not usually make, or order made, inspections, except upon complaint made. Meetings take place twice a month.

The powers of the board are derived from and defined by the legislature in organic act, and such powers are independent of any other board or council, except in the matter of expenditures, in which it is under control of Hudson County board of chosen freeholders, provided that the board has in time of epidemic the right to appoint inspectors for the period of ten days, who shall receive $5 per diem. The period of service may be extended by consent of the board of chosen freeholders. The authority of the board exists at all times and extends to the enactment of ordinances providing sanitary regulations, and for the abatement of nuisances. It would appear to be within the power of the board to spontaneously take cognizance of defective house drainage, of defective sewerage, and of possible contamination of public or private water supply, &c. The board has not charge of the removal of ashes or garbage, but has a general sanitary superintendence of such matters. The same thing may be said of the cleaning of streets. The board has power to control the burial of the dead, and has passed ordinances upon the subject (see sanitary code herewith). It has no control over the ultimate disposal of garbage except insomuch as the method of doing it is in conflict with its rules as published in the sanitary code. The board compels by ordinance the isolation of persons sick of a contagious disease.

The ordinances of the board assume the right of the board to send to hospital a person sick of a contagious disease. Section 4 of organic act says, in effect, "that persons sick of a contagious disease may be removed to the hospital provided for the reception of such patients." The board has always urged such removal, but never hitherto exercised undue pressure.

The necessity of vaccination is inculcated by ordinance, but vaccination is not compulsory; such power to insist on it is not specifically delegated. In the spring of 1876 the board offered vaccination with bovine virus free of expense to such as desired it. The schools were used as the points at which the vaccinating was done; about 5,000 persons, chiefly school children, availed themselves of this opportunity.

All contagious diseases (which are defined in section 4 of the sanitary code) must be reported within twenty-four hours, when the case is usually seen by one of the members of the board and provision made for removal or isolation.

The board records all the marriages, births, and deaths of the county, and issues monthly and annual statements of vital statistics. The number of the house and of the ward or district are some of the points of information necessary on a death return made to this board. Births must be reported on the proper blank in thirty days, by the physician or other attendant, under penalty of $30, recoverable by an action at common law. Marriages are to be reported by the person officiating, within thirty days, under a penalty of $10. Deaths must be reported within 36 hours under a penalty of $10. In all cases proper blanks for reporting the foregoing events are provided by the State.

The board of health reports to the board of chosen freeholders. The reports of the board are exchanged with about thirty corresponding boards.

The Hudson County board of health has on two or more occasions profited by the labors and assistance of citizens interested in sanitary subjects.

Respectfully,

C. J. ROONEY, Jr.,
Clerk Board of Health, Hudson County, New Jersey.

SCHEDULE S.

Registration and statistics of deaths and of disease in Hudson County, New Jersey.

In treating the subject of the registration and statistics of deaths and of disease, it is necessary to say that the plan followed in the cases of the other schedules upon which I have reported, viz, that of taking up the townships and cities in their order and treating of each *seriatim*, beginning with the most northerly and proceeding thence southerly until having completed the schedule, must in this case be discarded, as none of the cities or towns of Hudson County keep a registry of vital statistics with the exception of the city of Bayonne.

The board of health and vital statistics of Hudson County was incorporated on March 27, 1874. Among the duties imposed upon it was that of maintaining a registry of vital statistics for the entire county of Hudson. From this registry are drawn all the facts which follow, and unless otherwise stated reference is had in each case to the county at large. No interment in or removal from Hudson County can take place except upon a permit issued by the board of health and vital statistics. This permit is granted upon a certificate of death made by the physician who attended during last illness. In case of an accidental death, or of a death taking place without the patient having been seen by a physician, the matter is investigated by the county physician, who certifies as to the cause. No physician's certificate is recognized by the board of health and vital statistics until it is satisfied of his holding either a diploma from some regularly chartered medical college, or a State license duly authenticated. A registry of such physicians, practicing in Hudson County, is kept at the office of the board. This rule has, to my personal knowledge, led to irregular practitioners to avoid settling in this county. Certificates of death are recorded at the office of the board in books arranged for the purpose and alphabetically indexed. The same mode of procedure is followed in the case of births and marriages. In case of the deaths, the requirements of the law and the rules of the board insure a complete registration. Births and marriages not being easily susceptible of such complete and effectual supervision are not completely returned. Many physicians do not report through negligence, others take advantage of the difficulty of detection to deliberately evade the requirements of the law, and the majority are inclined to be dilatory. Midwives, as a class, make more complete and painstaking reports than do the physicians as a class. This probably arises from their more lively dread of the penalties of the law.

The marriage returns show carelessness on the part of some clergymen, they regarding the duty imposed upon them as an unjustifiable interference by our lawgivers with certain vested rights. That the State has no right to exact from them any labor, or to cause them to incur any expense, without reimbursing them, is an argument occasionally advanced. However, I think that there is a general improvement in the matter of making returns; an improvement that would be made more marked and permanent, by the rigid enforcement, in a few cases, of the plainly set forth penalties of the law for the non-observance of its provisions.

Statistics of mortality and of the marriages and births have annually been published since the organization of the board of health and vital statistics. (See reports for the years 1875, 1876, 1877, and 1878.) By the provision of section 57 of its "sanitary code," the board of health requires, under a penalty of $50 for non-compliance, the reporting within 24 hours by the attendant all cases of contagious disease. The report must contain the name of the person, state of the disease, and condition of dwelling. The phrase "contagious disease" by the terms of section 4 of the sanitary code is held to mean diseases of "an infectious, contagious, or pestilential nature"; it is, however, stated to refer "more especially to cholera, yellow fever, small-pox, diphtheria, ship or typhus, typhoid, spotted, relapsing, and scarlet fevers, and also to include any other disease publicly declared by this board to be dangerous to the public health."

As to interrogatory No. 10 of this schedule, touching the relative ratio of crime and ratio of disease and death in the different wards and sections of the place, I have to say: That the statistics of crime are not accessible, if to be reached at all, without an immense deal of labor, which I am unable to give to the task. That the ratios of disease cannot be given, as the reporting of any diseases except those of a contagious character is not required by the board. That the ratios of disease and death in the different wards and sections cannot be reached, as the forms of returns of deaths to this board do not call for this discrimination.

It has, however, been customary to compare the mortality and death rate of the county, divided for the purpose of such contrast, into three parts, to wit: 1st, Jersey City; 2d, Hoboken; and, 3d, all other parts of the county. I have endeavored to make such a comparison in the subjoined table.

It may be well to remark that Jersey City's limits comprehend, in all, about 8,000 acres, 4,400 of which is a ridge elevated from 60 to 160 feet above mean high-water, 2,200 acres are marsh, and 1,400 natural and made ground upon the Hudson River and New York Bay. Of the population, speaking roughly, about three-fifths dwell upon the lowlands, and the remaining two-fifths upon the rocky ridge. That on the lowlands is a pretty dense city population, while on the upland it is of a suburban character.

Hoboken has an area of 720 acres, being an upland district of 270 acres and a marsh to the westward of 450 acres, which, to a large extent, is but little else than a stagnant pond emitting, during the warm season, an exceedingly unpleasant odor. A city population covers the larger part of the inhabited portion of the city.

The division marked in the annexed table as "rest of county" consists for the greater part of townships situated upon the high ridge which runs through the county from north to south. The exceptions are Bayonne City, the town of Harrison, and the township of Kearney, whose respective populations dwell upon uplands of an elevation of from 20 to 150 feet in height, having contiguous peaty marshes. The population of this division is either very sparse or of a suburban character.

A paper on the soil, contour, and drainage of Hudson County, contributed by L. B. Ward, C. E., to the annual report of the board of health and vital statistic for 1877, is the source whence are derived all the figures and most of the descriptive portions of the foregoing paragraphs as to areas, soil, population, &c.

Estimated population and deaths per 1,000 *inhabitants in Jersey City, Hoboken, and "rest of county," for the years* 1875, 1876, 1877, 1878, *and* 1879.

Year ending December 31.	Population.				Deaths in—				Deaths per 1,000 inhabitants.			
	Hudson County at large.	Jersey City.	Hoboken.	The "rest of county."	Hudson County at large.	Jersey City.	Hoboken.	The rest of the county.	Hudson County at large.	Jersey City.	Hoboken.	"The rest of county."
*1875........	163,000	109,227	24,766	29,007	4,230	2,836	743	651	25.95	26.01	29.72	22.45
1876........	171,336	115,136	25,828	30,372	4,520	2,988	800	732	26.43	26.00	30.77	24.40
1877........	180,186	121,364	26,940	31,802	3,937	2,548	719	670	21.83	21.06	26.62	20.94
1878........	189,210	127,812	28,098	33,300	3,796	2,409	712	675	20.08	18.97	25.42	20.42
1879........	196,989	134,812	29,303	34,868	3,826	2,408	666	752	19.23	18.06	22.97	21.48

*State census.

Cholera has not caused any great mortality during the period covered by the records of the board of health. The deaths reported during the last five years are as follows: 1875, 18; 1876, 25; 1877, 13; 1878, 14; 1879, 15.

Cholera infantum in 1875 and in 1876 assumed the proportions of an epidemic, causing 379 deaths in 1875, and 485 in 1876. In 1877 the mortality from this cause fell to 257 deaths, and in 1878 rose to 270; in 1879 it reached the lowest point in five years, 173 deaths.

Yellow fever caused one death in 1876.

Scarlet fever is charged with a mortality as follows: in 1875, 114 deaths; in 1876, 183; 1877, 213; 1878, 113; 1879, 232. In 1879, therefore, the deaths from scarlatina reached the maximum number for five years. In 1877 and in 1879 it may be said to have been epidemic to a slight degree.

Diphtheria was quite formidable in 1875 by its virulence and tendency to spread. Since that year, at which time it caused the largest mortality for any of the past five years, it has gradually decreased in the number of its victims, reaching the lowest point in five years in 1879. The deaths for the quinquennial period were as follows: 1875, 533; 1876, 327; 1877, 231; 1878, 177; 1879, 120.

Cerebro-spinal fever caused in five years the following deaths: 1875, 55; 1876, 17; 1877, 13; 1878, 4; 1879, 20. The newspapers, by some sensational reports, caused an alarm as to this disease in the latter part of 1879.

It is impossible to obtain information relative to the following points:

1. Number of inhabitants under one year.
2. Number of inhabitants aged one to five years.
3. Number of inhabitants aged five to fifteen years.

As to the questions, "what diseases are less prevalent now than formerly" and "what diseases are more prevalent now than formerly," I have been unable to obtain any authentic and reliable data except for the period since the establishment of the board of health and vital statistics.

Diseases less prevalent than formerly.—Typhoid fever: the deaths from this disease in 1878 and in 1879 aggregated less than in the preceding three years. The deaths in the five years under consideration were as follows: 1875, 52; 1876, 56; 1877, 46; 1878, 31; 1879, 36. The death rates per 1,000 for typhoid fever were: 1875,.319; 1876, .327; 1877, .255; 1878, .164; 1879, .181.

Dysentery has exhibited an annual decrease in the number of its victims since 1875 excepting in 1876–'77. The deaths were, in 1875, 73; 1876, 80; 1877, 77; 1878, 67; 1879, 34. It will be noted that in 1879 the decrease was about 50 per cent. of the mortality of any of the previous years mentioned. Rates per 1,000 for dysentery: 1875, .447; 1876, .468; 1877, .428; 1878, .354; 1879, .171.

Diarrhœa: Another gradual decrease of mortality for the term of years since and including 1875 is to be observed in the case of diarrhœa, excepting the year 1879, which shows a slight increase over preceding year. Deaths in 1875, 110; 1876, 69; 1877, 58; 1878, 30; 1879, 39. Rates per 1,000: 1875, .674; 1876, .403; 1877, .322; 1878, .158; 1879, .196.

Diphtheria exhibits a well.marked gradual annual decrease in its mortality since 1875. The deaths in 1875, 533, were nearly 13 per cent. of the total mortality for that year; in 1876 there were 327 deaths; 1877, 231; 1878, 177; 1879, 120. Rates per 1,000 for diphtheria: 1875, 3.27; 1876, 1.91; 1877, 1.28; 1878, .93; 1879, .60.

Croup: the number of deaths from this disease was lower than in any year of the five. Mortality in 1875, 149 deaths; 1876, 110; 1877, 98; 1878, 114; 1879, 97.

Measles exhibited the following fluctuations in its mortality: 1875, 3 deaths; 1876, 51; 1877, 1; 1878, 20; 1879, 4. The number of deaths from pneumonia has annually decreased in 1877, 1878, and 1879.

Diseases more prevalent now than formerly.—Malarial fevers: the deaths from this class of fevers appear to have been on the increase during the past three years, 1879, however, showing a falling off from the number in 1878, in which year the highest point was touched. Mortality in 1875, 47; 1876, 45; 1877, 66; 1878, 84; 1879, 79. Rates per 1,000: 1875, .288; 1876, .263; 1877, .366; 1878, .444; 1879, .400,

Whooping-cough caused more deaths in 1879 than in any year of the past five, excepting 1877. The cases of death were as follows: 1875, 27; 1876, 34; 1877, 51; 1878, 24; 1879, 49. The rates per 1,000 were: 1875,.165; 1876, .198; 1877, .285; 1878,.127; 1879, .247.

Cerebro-spinal fever in 1879 showed an increase of mortality chargeable to it as compared with 1878. The figures for 1875 were 55; 1876, 17; 1877, 13; 1878, 4; 1879, 20.

Heart diseases have increased annually in number and death rate since 1876. The number of deaths was, in 1875, 136; 1876, 174; 1877, 124; 1878, 161; 1879, 188. The death rates per 1,000 for the same period were: 1875, .834; 1876, 1.017; 1877, .688; 1878, .861; 1879, .950.

Diseases of the urinary organs have caused an annually increasing mortality for the past three years, viz: 1877, 1878, 1879. The deaths were, in 1875, 82; 1876, 88; 1877, 84; 1878, 96; 1879, 127. The rates per 1,000 for these years were: 1875, .503; 1876, 514; 1877, .488; 1878, .508; 1879, .641.

Puerperal diseases exhibit a gradual increase in the number of deaths chargeable thereto in the last four years ending December 31, 1879. The deaths for five years were, in 1875, 27; 1876, 21; 1877, 28; 1878, 30; 1879, 37. The death rates per 1,000 were, for 1875, .165; 1876, .123; 1877, .155; 1878, .158; 1879, .186.

As to whether or not immigrants from abroad or from other parts of this country suffer from the effect of the climate, &c., it would be useless to hazard an opinion, which would be founded only upon mere conjecture, there being no authentic information upon the topic now within my reach. The same may be said of the query as to the relationship existing between density of population and death ratio in the various sections of the cities or of the county. No official information or authentic data are to be obtained.

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Malarial fever:													
1875	4	3	2	7	5	5	3	1	7	4	3	3	47
1876	2	2	1	3	4	5	6	9	4	5	1	3	45
1877	7	....	8	3	2	6	6	9	5	9	5	6	66
1878	5	6	1	7	5	5	9	8	16	9	8	5	84
1879	3	7	3	6	1	9	7	10	15	7	3	7	79
Typhoid fever:													
1875	1	2	5	1	3	5	5	6	5	7	5	7	52
1876	5	2	5	1	3	1	6	10	6	8	8	1	56
1877	2	....	4	1	3	2	4	12	8	2	6	2	46
1878	8	2	....	2	2	....	3	3	5	1	3	2	81
1879	3	3	4	2	5	1	2	1	6	4	4	1	36

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Cerebro-spinal fever:													
1875	5	4	10	6	3	3	1	4	10	6	3	....	55
1876	2	2	2	1	2	2	3	....	1	....	1	1	17
1877	1	....	1	3	1	1	3	....	1	2	....	....	13
1878	1	....	....	1	....	....	....	1	....	....	1	....	4
1879	1	2	1	3	....	1	2	....	3	3	....	4	20
Erysipelas:													
1875	4	5	1	....	1	4	2	....	2	....	2	1	22
1876	1	....	1	....	3	1	1	1	....	2	1	2	13
1877	....	3	6	1	4	....	....	1	2	4	2	1	24
1878	5	....	1	2	2	3	2	2	1	2	3	2	25
1879	3	2	2	1	2	2	1	2	2	....	2	2	21
Dysentery:													
1875	2	1	2	3	5	6	27	19	6	....	....	2	73
1876	....	2	1	2	2	5	24	22	17	4	1	....	80
1877	1	2	1	4	....	4	15	17	15	8	7	3	77
1878	2	1	2	....	1	8	16	8	18	9	1	1	67
1879	2	1	1	1	2	2	10	7	3	2	....	3	34
Diarrhœa:													
1875	4	3	2	3	....	....	29	34	28	5	1	1	110
1876	7	5	4	1	2	2	22	11	9	4	....	2	69
1877	....	....	....	1	1	4	14	14	13	6	2	3	58
1878	3	....	1	....	....	6	8	9	1	2	....	....	30
1879	1	3	....	1	1	2	8	7	5	1	4	1	39
Scarlatina:													
1875	13	4	11	5	9	7	7	6	5	21	11	15	114
1876	24	21	12	26	9	12	11	5	7	8	19	29	183
1877	26	18	21	12	21	20	22	15	16	21	16	5	213
1878	14	13	23	10	6	11	2	6	3	5	12	8	113
1879	11	16	24	29	30	15	13	7	17	20	24	26	232
Diphtheria:													
1875	42	35	24	19	35	63	37	34	50	82	60	52	533
1876	47	47	36	26	27	21	18	17	21	17	28	22	327
1877	25	13	29	18	22	17	19	24	27	16	9	12	231
1878	10	10	7	8	14	16	12	20	18	22	25	15	177
1879	9	11	10	9	9	7	9	8	6	20	16	6	120
Croup:													
1875	9	12	11	11	11	7	6	9	13	19	18	23	149
1876	22	16	14	11	3	3	3	4	9	9	7	9	110
1877	11	9	10	9	7	6	9	4	5	8	13	7	98
1878	13	9	11	11	5	2	5	2	12	20	17	7	114
1879	10	10	12	4	1	5	5	3	11	14	17	5	97
Measles:													
1875	2	1	....	....	....	....	....	1	....	....	....	....	3
1876	1	1	1	3	21	6	12	2	2	....	2	....	51
1877	....	....	....	....	....	....	1	....	....	....	....	....	1
1878	....	1	2	4	1	5	6	1	....	....	....	....	20
1879	....	....	....	1	3	....	....	....	....	....	....	....	4
Whooping-cough:													
1875	8	3	4	...	2	3	....	4	3	1	....	1	27
1876	4	1	2	1	4	6	5	5	....	....	1	5	34
1877	6	3	6	6	1	5	6	6	3	4	1	4	51
1878	....	1	1	....	....	2	1	9	2	1	2	5	24
1879	9	2	11	6	4	4	2	5	2	....	3	1	49
Pneumonia:													
1875	41	34	36	22	39	17	7	18	14	24	28	35	315
1876	26	38	50	54	42	22	12	8	13	26	36	41	368
1877	62	36	85	28	27	17	8	9	15	17	19	24	347
1878	42	38	36	41	32	26	14	6	9	13	29	36	322
1879	58	39	38	31	17	16	6	7	6	21	36	27	302
Pleurisy:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	......
1876	....	....	....	....	....	....	1	....	....	....	....	....	1
1877	....	....	....	....	....	....	1	1	....	....	1	....	3
1878	1	....	....	....	1	....	....	....	...	1	....	....	3
1879	....	1	1	....	....	....	....	1	....	....	....	1	4
Phthisis:													
1875	12	30	33	37	34	43	40	39	37	52	36	30	453
1876	25	32	34	38	33	32	46	27	36	42	28	37	410
1877	48	39	55	40	38	35	38	36	30	34	39	40	492
1878	48	39	43	38	37	27	41	47	26	49	39	59	493
1879	45	41	42	31	39	33	28	42	40	34	60	39	474
All other diseases of the lungs:													
1875	19	24	20	18	13	7	9	10	16	14	19	31	200
1876	23	26	31	29	16	12	15	12	12	13	18	21	219
1877	21	16	7	19	12	8	8	5	5	17	19	12	149
1878	24	18	15	8	16	15	9	14	17	14	20	20	190
1879	26	17	20	15	11	6	6	11	7	15	18	19	171

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Diseases of the heart:													
1875	19	13	13	4	20	10	8	4	8	11	10	16	136
1876	15	13	20	9	13	16	15	11	14	13	18	17	174
1877	10	11	12	9	12	15	8	10	7	9	10	11	124
1878	11	16	20	22	16	13	9	4	16	5	16	13	161
1879	12	17	20	22	15	11	15	16	16	10	13	21	188
Diseases of the urinary organs:													
1875	6	7	6	2	5	7	7	6	12	5	6	14	82
1876	11	6	14	5	10	2	11	4	4	4	9	9	88
1877	6	8	9	12	7	10	7	10	5	4	6	4	88
1878	9	7	9	11	7	5	9	7	8	7	9	8	96
1879	8	10	13	10	8	11	8	2	18	17	14	8	127
Apoplexy:													
1875	8	1	9	3	2	4	2	5	11	7	5	7	64
1876	5	4	5	5	4	2	9	3	5	7	8	6	63
1877	4	4	4	7	7	3	5	2	4	4	5	8	57
1878	8	5	8	5	7	3	6	5	9	9	3	7	75
1879	3	4	7	5	7	4	9	5	6	2	5	2	59
Tetanus:													
1875	....	....	....	....	....	....	....	1	3	2	....	....	6
1876	....	....	....	....	1	....	6	....	2	2	....	2	13
1877	...	1	1	1	1	1	1	....	....	3	....	1	10
1878	3	1	2	1	5	2	1	....	1	2	1	....	21
1879	2	1	....	1	1	1	1	2	1	1	2	....	11
Hydrophobia:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	......
1876	....	....	....	....	....	....	1	....	....	1	....	1	3
1877	....	....	....	....	....	....	....	....	....	....	....	....	......
1878	....	....	....	....	....	....	....	....	....	....	1	....	1
1879	....	....	....	....	....	....	....	....	....	....	....	....	......
Puerperal fever:													
1875	2		3	2	4			2	2	1	....	1	27
1876	1	2	2	...	3	1	4	2	3	2	1	....	21
1877		3	8	3	...	1		3	2	2	3	3	28
1878	3	2	5	5	...	3		2	3	1	2	3	30
1879	2	3	9	3	2	2		2	4	....	7	2	37
Trichina: (None in any of the five years.)													
Deaths under one year of age:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	......
1876	....	....	....	....	....	....	....	....	....	....	....	....	......
1877	71	59	95	59	61	66	174	161	100	85	64	67	962
1878	80	63	64	57	62	94	226	113	90	69	59	76	1053
1879	97	67	65	54	69	60	174	111	70	68	65	65	965
***Deaths under five years of age:**													
1875	169	130	134	121	125	168	286	321	221	196	154	166	2189
1876	172	170	171	163	151	199	507	289	168	122	150	151	2413
1877	152	119	195	142	128	138	277	270	195	161	121	110	2008
1878	134	118	126	99	108	170	341	200	169	134	135	122	1856
1879	159	129	139	121	120	118	232	170	135	155	144	130	1752
†From five to twenty:													
1875	....	....	....	....	....	....	....	....	....	....	....	....	......
1876	....	....	....	....	....	....	....	....	....	....	....	....	......
1877	34	88	47	24	29	34	53	36	34	26	33	20	408
1878	23	20	28	28	29	21	34	25	17	29	34	20	317
1879	31	31	28	30	25	36	44	25	34	32	34	34	384
Still-births:													
1875	27	22	20	22	18	25	18	19	21	24	22	25	263
1876	30	21	30	26	28	34	26	21	21	36	32	19	324
1877	18	31	27	20	23	17	32	20	13	19	20	22	261
1878	22	16	16	19	20	21	22	25	28	22	23	24	258
1879	24	20	27	18	18	16	21	26	16	26	24	19	255
Reports of births in 1875, 1876, and 1877, were made bi-monthly:													
1875	903		640		398		587		897		607		4032
1876	158		425		332		1503		762		420		3600
1877	594		364		468		489		1224		551		3656
1878	432	198	299	110	364	276	342	273	369	283	329	260	3528
1879	229	313	294	277	165	130	303	318	285	203	232	852	3601

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*Cannot give deaths of children aged from one to five years.

†Cannot give deaths of persons aged from 5 to 15 years.

Respectfully,

C. J. ROONEY, Jr.,

Clerk Hudson County Board of Health and Vital Statistics.

SCHEDULE A.

Location, population, and climate of Bayonne City.

1. Name of city, county, and State?
City of Bayonne, Hudson County, New Jersey.
2. Latitude and longitude?
40° 40′ N.; 74° 6′ W.
3. When was the city founded?
1861.
4. When was it incorporated?
1869.
5. What was its population in 1870?
3,835.
6. What is its present estimated population?
8,000.
7. What is its present estimated population under 5 years of age?
700.
8. What is the estimated number of native and foreign?
About 4,000 each.
9. What is the estimated number of persons of European birth?
About one-half.
10. What is the estimated number of negroes and mulattoes?
100; of Asiatics, none.
11. Have meteorological observations been regularly recorded in the city?
Only partially.
12. If so, by whom and for how long?
By Ayres, druggist, for two years.
13. Have they been published; if so, where?
Partially in Bayonne Herald.

The following information is desired in the form of tables, to include the last 20 years, or so much thereof as possible, viz, mean, maximum, and minimum temperature of each month; direction and velocity of the prevailing winds in each month; amount of rainfall; mean, maximum, and minimum height of barometer for each month (corrected to freezing-point, but not to sea-level); records of relative and absolute humidity; electricity; ozone; number of clear and cloudy days.

SCHEDULE B.

Topography of Bayonne City.

1. Is the country surrounding the city level, hilly, or low and marshy?
Surrounded by tidal waters.
2. If there are mountains or considerable hills in the vicinity, state distance, direction, and altitude above the sea-level?
Staten Island, to the south, hilly, one-half mile distant; altitude about 240 feet.
3. If there are any marshes or low moist lands in the vicinity, state their distance, direction, extent, and character, and the variations as to water which such lands undergo at different seasons.
Salt marsh to the west, 1¼ miles distant.
4. What is the altitude above sea-level of the bottom of the lowest valley or ravine near by? In what direction does such valley or ravine trend?
No valley or ravine.
5. What modifications of meteorological conditions and what other influences upon health in the city are apparently due to topographical features of its immediate vicinity?
Nothing observable.
6. In what degree and in what direction is the city bordered by grass lands, forests, market gardens, farms, or villages?
7. Is the site of the city level?
Nearly.
8. Has the original conformation of the site been materially changed?
Not materially.
9. Have original water-courses been diverted, covered, or modified?
They have to some extent.

10. What is the elevation above sea-level of the highest, lowest, and average level of the town.

67 feet; 1 foot; 30 feet.

11. In what direction is the general surface slope of the city?

Southeast.

12. Is any part of the city what is known as "made land"; if so, how much and in what part of the city?

10 acres on New York Bay; 10 acres on Kill Von Kull.

13. What was the character of the ground before filling?

Bay being reclaimed.

14. Was it thoroughly drained before filling?

No.

15. To what depth and with what material was it filled?

Twelve feet; mud dredging and New York City garbage.

16. To what extent is the made land built upon, and with what class of houses?

As yet not built upon, intended for docks and warehouses.

17. What streams of water pass through or by the city.

None.

18. What is the average width of each?

19. What is the average depth of each, and what is their velocity; rapid, gentle, or sluggish?

20. Are the sides of these streams steep or gradually sloping; that is, when the amount of water changes, does it cover and expose any considerable width of shore?

21. Is the exposed shore hard ground or mud?

22. Are these streams or any of them affected by the rise and fall of the tide, and to what degree?

23. Is the water clean or foul? If foul, what is the source of the fouling?

24. Are the bed of the stream and its shores subject to the deposit of organic matter or of silt? If so, describe the deposit.

25. Is there in the course of these streams any shoal or flat which is at times laid bare or only slightly covered with water?

26. To what extent are there natural or artificial falls of water, as over dams, within or near the city, and what is the character of the fall?

27. What is the character of the stream above such water fall; deep and rapid, or sluggish with shoals?

28. What canal or race passes through or near an inhabited part of the city?

Morris Canal along the northern border.

29. Is the water in such canal usually clear, turbid, or muddy?

Muddy and foul.

30. Does foul surface drainage or sewage enter any of these streams? If so, describe manner and location of such entering.

31. If tidal stream, is such sewage or drainage borne up past the town by the incoming tide?

32. What bodies of water and what their locality, character, and extent, within or near inhabited portions of the city?

New York Bay on the east; Newark Bay on the west; Kill von Kull on the south, all salt; Kill von Kull ½ mile wide and 2½ miles long.

33. For what period of time, and at what seasons of the year, and at what stage of the tide is there stagnant water in any canal, stream, pond, or other body of water within or near an inhabited part of the city?

For two or three months in the winter the water in the Morris Canal is partially drawn off and the remainder is stagnant. There are one or two small ponds near it.

34. Does such stagnant water at any time emit a perceptible odor, and does it deposit organic matter or mud?

The surface of the canal in summer is covered with slime and is offensive.

35. Furnish, if possible, a contour map of the city and immediate vicinity on which are indicated the altitudes and the lines of main drainage and sewerage, or of natural drainage.

See map.

36. Is any part of the city or its vicinity subject to overflows, or saturation of soil; if so, to what degree, at what seasons, and what is the effect on health?

That part of the city comprising salt marsh subject to tidal overflow not known to be detrimental to health.

37. How does such saturation, whether from overflow or from rain, affect the height of water in wells, and to what extent?

No perceptible effect.

38. To what geological period or formation does the site and vicinity belong?

Azoic covered with alluvial.

39. What are the surface rocks?

Croppings of trap rock.

40. What are the underlying strata in order of succession from above downwards?

Sand and loam, hardpan and clay, black sand and trap rock.

41. What is their relative permeability by water?

Water strata in black sand.

42. In what direction do they dip, or slope, and at what angle?

No regular slope; gradually to the southeast.

43. What is the character of the surface soil?

Sandy and loamy.

44. When it is disturbed have malarious effects been observed?

No.

45. Are there continuous fissures in the rock, or continuous gravel streaks in the earth, through which soil water may flow?

No.

46. Are any diseases considered to be due to the soil or geological formation, or has the spread of any epidemic followed the direction of the flow of underground water? If so, specify, and state reasons for so reporting.

No.

SCHEDULE D.

Water supply of Bayonne City.

1. From what source is the chief water supply derived?

Wells and cisterns.

2. If from a river or stream, what towns, villages, factories, or other sources of contamination are located upon the river or stream above the point at which the water is taken?

3. To what extent is the immediate gathering ground from which the water is drained manured with night-soil or other excrement?

4. From what distance is the water brought?

5. In what form of conduit?

6. What is its capacity?

7. To what extent and at what points is it accumulated in settling or other reservoirs?

8. Is any process for filtering or purifying used beyond reservoir settling?

9. What is the average amount of water per diem flowing into reservoirs? Their highest capacity for storage?

10. What is the average amount of water per diem; the maximum, the minimum?

11. How many gallons daily to each inhabitant; the average, the maximum, the minimum?

12. How much water is on an average in storage in reservoirs and available in case of fire?

13. Give results of chemical analysis if possible.

14. Has the water supply been offensive in taste or odor at any time; if so, at what time and to what was the change due; and if it has been remedied, how?

15. To what extent is the town supplied with public fountains? With fire-plugs?

There are none.

16. To what extent is water from artesian wells used? What is the depth of such wells?

A few at the factories on Constable's Hook; about 60 feet.

18. What is the character of the water?

Brackish.

18. What is the chance of organic contamination reaching the strata by which the well is supplied?

Very little.

19. To what extent is cistern, spring, or well water used?

Almost entirely.

20. In that part of the city where well-water is used, what is the character of the soil?

Sandy, clay, and loam.

21. What is the usual depth of wells to the bottom and to the surface of the water?

From 20 to 25 feet; from 10 to 15 feet.

22. Are cisterns, springs, or wells so located and constructed as to be free from sewage and cess-pool contamination?

Mostly; not in the tenement portion of city, fourth ward, and Constable's Hook.

23. If yes, state reasons for the opinion. If no, state reasons for apprehending contamination.

In some cases too close proximity to privies.

24. Has the use of well-water been productive of sickness; if so, what sickness; to what extent epidemic or sporadic?

No.

25. Character and quality of well-water, specially as to presence of organic matter and chlorides.

The water is comparatively pure, with some exceptions in tenement district.

26. Has disease arisen from use of lead pipes?

No.

27. Are there any public baths; if so, how are they arranged, and to what extent are they used? Furnish a copy of their rules and regulations.

No.

Are there public drinking fountains? If so, how generally?

About 10 wells with pumps.

SCHEDULE D.

Drainage and sewerage of Bayonne City.

1. What is the area included within the city limits?

Two thousand five hundred and sixty acres.

2. What area is closely built up as compared with what may be called "country or suburban area."

One hundred acres.

3. What is the character and sufficiency of the surface drainage?

Grades of streets run to bay.

4. Have any underground drains been constructed to act exclusively as such; if so, for what area?

A few for small areas and for temporary purposes.

5. At what depth are they placed at the highest point? What rate of fall have they?

6. Are there swamps, areas of made land, or places saturated with water near or in the town which are undrained? If so, describe.

About 500 acres of salt meadows.

7. Are the cellars in any part of the town liable to an overflow of water in heavy rains or to the intrusion of soil-water?

Yes.

8. Is there any system of sewerage in the town? If so, is it part of a regular plan? If so, furnish copy of plan.

Yes. (See map.)

9. How many outlet sewers are there?

Four.

10 Where do they discharge?

Two in Kill von Kull; one in New York Bay; one in ditch on salt meadow.

11. What is their diameter at mouth?

Two are 4 feet; 2 are two feet.

12. Of what material are they constructed?

Brick.

13. Are they tightly cemented?

No.

14. Give their shape in cross-section.

Egg shape.

15. Do they retain deposits, or are they kept entirely clean by their flow?

They are kept very nearly clean by their flow.

16. Are they kept free from obstruction by artificial means; if so, by what means?

If foul, cleaned by manual labor.

17. What proportion of the area of the city is not sewered?

About nine-tenths.

18. How much of this area is built upon?

About one-fourth.

19. What is the total length of subsidiary sewers discharging into these outlet sewers?

Total length of sewer in city 4½ miles.

20. Give the size, construction, and shape of the different parts of these sewers, as indicated above for the outlet sewers?

All sewers built are egg-shape, except Cottage street sewer, which is circular. In Bergen Point basin lateral sewers are equal to 2 feet circular. In other basins they are three feet.

21. Does the surface drainage pass into sewers; if not mainly, then to what degree?

It does.

22. If so, is their capacity sufficient in heavy storms?

It is.

23. Is any attempt made to utilize the sewage; if so, how, and with what result?

No.

24. Are the sewers ventilated in any way; if so, how?

By man-holes every 100 feet.

25. Are there municipal regulations concerning the drains which connect houses with the sewers; if so, furnish a copy; are such regulations strictly complied with?

They are. (See Ordinances.)*

26. Is there a trap required in the course of this connecting drain; if so, state its location and character?

No.

27. Is it compulsory that all house drainage be conveyed to the sewer; if not, to what extent are other means resorted to, and what are the means?

No. When possible, houses are connected with the sewers.

28. Are odors ever perceptible from the sewer openings or outlets; if so, to what extent do they exist?

No.

AN ORDINANCE to regulate the tapping of public sewers and making connections to the same.

The mayor and council of the city of Bayonne do ordain as follows:

SEC. 1. That the board of councilmen shall from time to time by resolution appoint as many masons, skillful and competent in the work of tapping sewers and making connections to the same, as they may deem necessary, who shall be called "licensed masons," and shall hold their office as such during the pleasure of the said board of councilmen.

SEC. 2. Each mason appointed a licensed mason as in the first section of this ordnance mentioned, shall within twenty days after his appointment, take, subscribe and file with the city clerk the oath or affirmation required by section 22 of the city charter, and within the same time also file with the city clerk a bond approved by the said board of councilmen, in the amount of five hundred dollars, conditioned for the faithful performance of the duties required of him by this ordinance, and for the payment of all damages that may be occasioned by his neglect or want of proper skill.

SEC. 3. The tapping of every sewer must be done and the connection thereto must be made by a "licensed mason," appointed and qualified as aforesaid, who before the commencement of the work of making said connection or tapping a sewer shall make application to the board of councilmen, or to the street commissioner, in writing, stating the location of the premises to which the connection is to be made, the place where the sewer will be tapped, the kind of drain or connection proposed and the time when the trench will be ready for the connection to be made, and pay to the street commissioner or city clerk the sum of two dollars (to be paid by said street commissioner or city clerk into the city treasury), and obtain from the board of councilmen or street commissioner a written permit for the same, which shall state the place where the connection is to be made and the kind of drain or connection permitted. In case the permit shall be granted by the board of councilmen it shall be attested by the city clerk, and in case it is granted by the street commissioner it shall be signed by him.

SEC. 4. It shall be necessary to obtain a permit to make connections with sewer connections that have been laid to curb line, in the same manner as though the connection is to be made to the sewer itself.

SEC. 5. In excavating in streets, roads or avenues, for the purpose of making sewer connections as aforesaid, the material taken from the excavation must be so deposited as to cause the least obstruction possible to travel; the trench or hole must not be left open at night; the surface of the street, road or avenue shall be restored to its former condition and so kept by the mason making the connection at his own expense for six months.

SEC. 6. The street commissioner or board of councilmen shall have power to stop, or to direct, the making of any sewer connection when the same is being constructed in an unskillful manner or with improper materials, or of improper size, or in a place other than that designated in the permit.

SEC. 7. No person other than a licensed mason appointed and qualified as herein provided, and having a permit obtained as above required shall tap any sewer, or make any sewer connection, or coonnectionwith sewer connections that have been laid to the curb, under a penalty of twenty-five dollars for each offense and a further penalty of two dollars for each day such connection shall remain after notice by the street commissioner to the owner or owners of said premises or to the occupant or occupants of said premises to have the same remvded.

Passed September 2, 1873.

Approved September 3, 1873.

HENRY MEIGS, *Mayor.*

Attest:
W. C. HAMILTON, *City clerk.*

SCHEDULE E.

Streets and public grounds of Bayonne City.

1. What is the usual width of the streets?
60 feet.

2. What is the usual width of the sidewalks?
One-fifth of the width of the street.

3. Are the sidewalks paved, and with what material?
Blue stone, 4 feet wide.

4. Do the streets differ in healthfulness or comfort owing to direction; if so, specify?
Not perceptibly.

5. What is the total length of streets paved?
One mile.

6. What is the material generally used?
Macadam.

7. What is the total length of the streets unpaved?
43 miles.

8. What is the character of the soil?
Sandy and loamy.

9. Are the streets unduly wet in the spring of the year?
Yes.

10. How are the roadways constructed?
With a center crown of about 15 inches.

11. How much wooden pavement exists?
None.

12. How much stone pavement, cobble stones, or blocks?
None.

13. How much asphalt or concrete pavement; how much macadam or gravelled roadway?
One mile of macadam.

14. What are the arrangements and regulations for cleaning and watering the streets?
None. Streets in charge of street commissioner.

15. Are the results satisfactory as to cleanliness of the streets? If not, specify defects.
Yes.

16. Are shade trees planted along the streets; if so, how arranged and of what kind?
(See Ordinance.) Mostly maple.

AN ORDINANCE to regulate the planting of shade trees, and for the protection thereof.

The mayor and council of the city of Bayonne do ordain as follows:

SEC. 1. That no person shall plant, or suffer or permit any tree or shoot to be planted in any street in the city of Bayonne, which street is less than forty feet in width, under the penalty of five dollars for every such offense.

SEC. 2. That no tree or shoot shall be planted upon any sidewalk or foot-path in any street in the city of Bayonne, at a less distance than two feet, nor at a greater distance than three feet, from the outside curb line of said sidewalk or foot-path, under the penalty of five dollars for each offense, to be recovered from the owner or owners, or occupier or occupiers of the property fronting and binding upon said sidewalks or foot-path, severally and respectively. And the planting of all shade trees in any street in the city of Bayonne shall be under the direction of the committee of the council on assessments, sewers and streets, and the street commissioner shall personally superintend the work.

SEC. 3. That no person shall wilfully break, pull down, hurt or destroy, or fasten any horse or beast to any tree or shoot standing in any street or public place in the city, under the penalty of ten dollars for each offense; provided nothing herein contained shall be so construed as to prevent the street commissioner from removing any tree or trees, or part thereof, he may deem so situated as to obstruct the carriage-way, foot-way, or any proprietor of a lot or lots from cutting down any tree or trees near the gutter in front of his or her lot.

Passed August 9, 1870.
Approved August 12, 1870.

HENRY MEIGS, *Mayor.*

Attest:
F. I. SMITH, *Clerk.*

17. Does the asphalt pavement injure the trees?
18. Does gas injure the trees?
No.
19. Do the trees have any direct effect upon health; *e. g.* ailantus, eucalyptus?
No.
20. Are they cared for by the corporation or by individual property-owners?
By property-owners.
21. How many public parks belong to the city?
One.
22. State the dimensions of each.
Two hundred by two hundred.
23. Are they within the city limits?
It is.
24. How many open squares within the city limits?
None.
25. What is the area of each?
26. Are the public parks and squares kept in good condition?
No.
27. Are public fountains placed in the parks?
No.
28. How many public urinals in streets and in parks?
None.
29. Are any areas for and sources of amusement provided in the parks?
No.
30. Furnish copies of any regulations or ordinances relating to care and management of the parks.
31. To what extent is life endangered by improper arrangement and management at railroad crossings within the city?
But one crossing, and that has flagman. Life endangered at Centreville Depot crossing.
32. How many lives lost from this cause during the last five years?
One this year and several accidents.
33. What number of accidents occurred last year on street railroads?
None; no street railroads.
34. What number of accidents resulted from efforts to get on or off the front platforms of street cars?
None; no street railroads.

SCHEDULE F.

Habitations of city of Bayonne, N. J.

1. How many dwelling-houses are there within the city limits?
About 1,200.
2. What proportion of these are inhabited by the owners?
About one-third.
3. What is the average occupancy of each dwelling? Specify, when practicable, the rate in different parts of the city.
Seven throughout the city. In a few tenements located at Constable Hook and the Fourth Ward the average is 10.
4. How many are tenement-houses; that is, occupied by two or more families?
About 300.
5. How many houses are overpopulated; give details of location and effects in a special report, if possible.
Not any.
6. Are there any municipal regulations about overpopulation; if so, what are they?
No.
7. Is there any regulation as to the material of which and the manner in which houses shall be constructed within the city limits; if so, what is it, and is it practically enforced?

The following provision is made in the charter, sec. 40, sub-sec. 18, viz: "To regulate the manner of building dwelling-houses and other buildings, and of constructing and placing steam-engines, engine chimneys, ovens, flues, pipes, and all matters connected therewith, and the keeping of lights in stables, and the manufacture and keeping of gunpowder, petroleum, fire-works, and all other dangerous and combustible articles; to provide water for extinguishing fires, and to limit the height, and prevent in certain limits, to be from time to time prescribed by ordinance, the erection of wooden buildings." But no ordinance has as yet been prescribed for the same.

8. Have any houses been condemned as unsafe within the last year; if so, how many?
No.

9. Have any been condemned as unfit for habitation for other reasons; if so, how many and for what reasons?
Some by reason of defective drainage, &c., but have been abated by owners under notice and penalty from the city board of health.

10. What proportion of the dwelling-houses have connection with the sewers? Of these, what proportion are connected by tight drains, with suitable traps?
All dwellings located along the line of sewers (see engineer's map), and where practicable a short distance off the line of the sewers, have connections with the sewers by tight drains and traps.

11. Do any houses have springs, cisterns, or wells in the basement or cellars for water supply?
A very small number of houses have cisterns in the cellar for water supply.

12. What proportion of the dwelling-houses are isolated buildings with sufficient yards or clear space all around them?
A very large proportion.

13. Do you know of any houses in which special arrangements are made for ventilation? If so, give particulars.
Not any with special arrangements.

14. Are the cellars and basements in any part of the city damp or insufficiently drained? If so, specify.
A few cellars off the line of sewers are damp, and are the receptacles of surface water by reason of insufficient drainage.

15. What proportion of the habitations is furnished with proper bathing facilities?
About one-third, that is with bath rooms, &c.

16. Are the cellars used for storing fuel? Are ashes and other sweepings from houses deposited in cellars?
Yes. Yes, temporarily.

17. Have any diseases occurred which seem to be due to overcrowding or unfitness of dwellings or bad condition of cellars? If so, specify.
No.

18. Does the fuel used have any influence upon health? If so, specify.
No.

19. Is the ground under basement floors usually cemented?
Not usually.

20. Are basements generally wainscotted?
Very few basement houses in the city. These are wainscotted.

21. What is the height of buildings in comparison with the width of streets?
About one-half.

22. Have any ill effects been observed from arsenic paper in sleeping and living rooms?
No; not of late years.

SCHEDULE G.

Gas and lighting of city of Bayonne, N. J.

1. Is the city lighted by gas?
Yes.

2. Where are the gas works located?
Corner Hobart avenue and Oak street, Fourteenth Ward.

3. Are all the streets lighted, or what proportion?
In section known as Bergen Point, nearly all the streets built up are lighted. Centreville and Bayonne lighted through the main street, and down to railroad depots. Pamrapo (Third Ward) not lighted at all.

4. Are alleys in which there are dwellings lighted by gas?
There are no alleys.

5. Are they a nuisance to the neighborhood?
The works are not a nuisance.

6. What process of purification is used?
Dry lime.
7. Is it satisfactory; if not, why not?
Satisfactory.
8. What becomes of the refuse?
Part sold for agricultural purposes, part used for filling in.
9. At what price is the gas furnished?
Three dollars per 1,000 feet to metre consumers; about $2.25 to city.
10. Is the quality of the gas furnished satisfactory, as to illuminating power, odor, &c.?
Satisfactory on all points.
11. Have any injurious effects to health been observed from the gas? If so, please specify.
No injurious effects. On the contrary, children brought to works for treatment of whooping cough.
12. If any analyses of the gas furnished have been made, or any tests of its illuminating power, please give results.
No thorough analyses made. Photometric observations constantly made. Average power about 16¼ candles.
13. What proportion of dwelling houses are not lighted with gas?
At Bergen Point, about one-fourth; Centreville, hardly any; Bayonne, about one-eighth; Pamrapo, none are lighted.
14. What precautions are taken to ascertain the grade of, and what restrictions exist on the sale of burning fluids, kerosene, &c.?
To flash at 100° Fahr.
No regulation exists on the sale.
15. How many accidents have occurred from explosions of these fluids within the last five years?
Two or three by careless habit of throwing kerosene on stoves to light fires, &c.
16. How many accidents have occurred from the explosions of gas within the last five years?
None.

SCHEDULE H.

Garbage and excreta of city of Bayonne, N. J.

1. What is the law as to the removal of garbage? Furnish copy of law if possible.
There is no law as to the removal or disposition of garbage.
2. How exactly is the law complied with?
3. Is the kitchen refuse required to be removed in covered vessels?
No.
4. Are the garbage, ashes, &c., removed by the corporation employés, or by private contractors?
Neither.
5. Is this removal at the expense of the corporation or of the householder?
6. Where is it taken to?
7. How often is it removed?
8. What is the ultimate disposition made of it?
9. Are the removal and ultimate disposition promptly and satisfactorily performed?
10. Does any nuisance or probable damage to health result from infrequent removal, improper keeping before removal, improper handling during removal, improper manner or place of deposit, or neglect during any part of the process? Specify minutely.
11. If the removal is at the cost of the corporation, what was its cost during the last fiscal year.
12. If at the cost of the householders, give estimated aggregate cost to them for the same period.
There is no regular method for the disposition of ashes, garbage, and excreta. In that section of the city adjoining farms and gardens the garbage and refuse is used for compost. By a few in the city it is burned in the stoves. By many it is thrown into vacant lots to decompose or be consumed by fowls; from some places it is removed voluntarily by persons having swine to consume it, or by men and boys employed by the householder. The ashes are generally used for filling in roads and vacant lots. This irregular manner of disposing of house-refuse, will, as the city grows, be a great source of detriment to the public health.
13. What disposition is made of dead animals?
14. What number of dead animals of different kinds were so disposed of during the last year?

Small animals are buried by the owners or by the street department, the larger ones, such as cows, horses, &c., are taken away by J. T. Autenreicht, of Jersey City. About 30 small animals and 20 large have been thus removed during the last year.

15. Is the matter of disposal satisfactory; if not, why not?

Satisfactory for the present.

16. What is the number and proportion of houses of which the kitchen and laundry waste-water is delivered into cess-pools on the premises?

There are a very few cess-pools in the city.

17. Are these cess-pools tight or porous, or what proportion of each?

Porous.

18. Are they furnished with overflows; if so, to what extent and where does the overflow deliver?

No. The drainage from the houses is into the sewers—into the bays—or laundry drainage into the gutters.

19. To what extent is the flush tank used and in what manner?

To a limited extent. Water pumped into tanks from cisterns and wells, and used for hot and cold water for bath-rooms and laundries, and to flush water-closets, &c.

20. To what extent are absorption drains under the surface of the soil used?

To a limited extent.

21. Where cess-pools are used, what proportion of them receive the waste of water-closets?

Not any receive the waste of water-closets.

22. What are the regulations and methods with regard to constructing and cleansing cess-pools?

Not any.

23. Are the methods in use satisfactory; if not, why not?

24. What proportion of houses have water-closets?

A small proportion.

25. What proportion of these deliver directly to a public sewer?

Mostly all deliver into sewers.

26. What proportion to cess-pools?

None.

27. What proportion of the houses depend wholly or partly on privy vaults?

A large proportion.

28. What proportion of the privy vaults are water-tight?

Not any.

29. What are the regulations and methods with regard to constructing and cleansing such vaults?

No regulations.

30. Have any cases occurred of contamination of wells or cisterns by privy or cess-pool drainage. If so, give particulars or references, especially where the matter has been carefully investigated.

Some wells have become contaminated by the too close proximity of privies, and by surface drainage, the water being unfit for use.

31. To what extent is the dry-earth system used?

No extent.

SCHEDULE I.

Markets of city of Bayonne, N. J.

1. Are the markets established by law or custom?
2. If by law, give a copy of the law or laws.
3. If by custom, state the usages and regulations.
4. How many public market-places are there?
5. State for each the location, number of buildings, dimensions.
6. State for each building, dimensions, number of stories and height of each, material of which constructed, cost, number and size of stalls, and mode of their arrangement.
7. How many meat stalls are there?
8. How many fish stalls are there?
9. How many butter and cheese stalls are there?
10. How many vegetable stalls are there?
11. Are the stalls rented or sold?
12. What is the average cost of each?
13. On what days and at what hours are the markets open?
14. What are the regulations as to cleanliness?
15. Are they properly enforced?

16. Are the buildings public property?

17. If so, are they sources of revenue to the city?

18. What is the system of inspection of markets?

There are no public markets in the city of Bayonne, N. J.

19. Give number, title, salaries, and duties of municipal officers charged with inspection of food and markets.

20. Is the supply of fresh meat satisfactory as to quantity, quality, and variety?

21. If not, why not?

22. Has any meat or fish been condemned by the inspectors within the last year; if so, how much, and for what reason?

23. What distance, and by what kind of conveyance are meats and vegetables brought to market?

24. Are any fowls, calves, sheep, &c., brought to market and sold; and if so, what proportion?

25. What proportion of fowls are brought and sold to consumers alive?

26. Is the supply of vegetables and fruits satisfactory as to quantity and quality?

27. What proportion of the supply is derived from the immediate vicinity of the city?

28. Have any fruits and vegetables been condemned by the inspector within the last year? If so, state quantities.

No public markets in the city of Bayonne, N. J.

Sec. 40, Sub. sec 14 of the charter, has this provision: "To license and regulate hawkers, hucksters, butchers, slaughter-houses, and markets, on such terms and under such regulations and penalties as the board of councilmen shall by ordinance impose, and no other license for such purpose, within said city, granted by any other authority, shall be lawful, except licenses granted by the governor to hawkers and peddlers.

The following ordinance to license peddlers was passed November 10, 1874, approved November 11, 1874:

"SEC. 1. No person shall hawk or peddle or expose for sale any fruit, vegetables, or other produce, or any merchandise, good or articles of any description, whether through or along any of the highways, or from any stand or wagon stationed in any of the highways, without being duly licensed, as hereafter mentioned, under the penalty of ten dollars for each offense.

"SEC. 2. The mayor, upon recommendation of the council, is hereby authorized to issue a license to any person to whom the foregoing section may apply, which license shall be in the sum of not less than ten dollars, nor more than twenty-five dollars, and shall expire on the first day of May next after the granting thereof.

"SEC. 3. The foregoing section shall not apply to farmers within the city limits bringing any of their produce into the city to be sold, or to persons having stores or other places of business in said city, who may use or employ any wagon, or wagons, in connection therewith.

"SEC. 4. All ordinances and parts of ordinances, and all resolutions and parts of resolutions in any manner relating to the licensing of peddlers, heretofore adopted or passed, are hereby annulled or repealed, and shall be of no force or effect.

"SEC. 5. This ordinance shall take effect immediately."

29. Are there any municipal regulations with regard to hucksters, to private markets, or hawking of fruits, &c., in the streets? If so, give copies.

30. Are fruits and vegetables offered for sale without regard to quality?

No.

31. Are any facilities afforded to producers, as sheds, stands, &c.?

32. Can the producers of vegetables, &c., *i. e.*, the market gardeners, sell direct to the consumer without being subject to any tax?

Yes.

33. What proportion of them sell direct to the consumers?

Very few.

34. Describe milk supply, as to source and quality?

Mostly from private sources, and from milkmen residing in the city, and pasturing and keeping their cows in the city. Quality good. First class.

SCHEDULE K.

Slaughter-houses and abattoirs of city of Bayonne, N. J.

1. From what part of the country are animals obtained for the markets?
2. How many are annually slaughtered for the city in which you reside?
3. How are they conveyed to the place at which they are slaughtered?
4. Are means adopted, by legislation or otherwise, for supplying food, water, air, and exercise to animals while in transit?

5. Are animals, when sent to market, submitted to inspection before or after slaughtering?

6. Are they washed before being killed?

7. Can you give any observations as to the effect of terror in animals producing changes in secretions or flesh, whereby their milk or meat is rendered injurious as food?

8. What is the effect upon their flesh for the market of depriving animals of food and drink for twenty-four hours, provided this be a day or two before they are killed; or, secondly, immediately before they are killed?

9. What diseases, and what stages of disease, in animals have been observed as rendering their flesh injurious as food?

10. What is the mode of slaughtering?

11. Are they kept from seeing the various results and processes of butchering?

12. What disposition is made of bodies of animals that die in transit?

13. Can you give any statistics, of the number of animals and quantity of meat condemned yearly, and why condemned?

14. Are abattoirs erected at public or private expense?

15. Is the establishment of abattoirs and the business of slaughtering governed by legislative action, state or municipal?

16. Is the business of slaughtering concentrated in large establishments or scattered in small?

17. Are they within or beyond the city limits?

18. Do the abattoirs drain into covered sewers or open sewers flowing through a part of the city?

19. Are abattoirs considered as nuisances in the neighborhood? If so, for what reasons?

20. If a system of abattoirs is adopted in your city, what facilities are offered to butchers for slaughtering?

21. How does the profit to the butcher, under the new system, compare with that under the old?

22. What rents are paid by them?

23. What disposition is made of the fats, tallow, blood, and animal refuse?

24. Is the refuse of abattoirs given to hogs kept for the purpose? If so, what regulations protect the public from consequent nuisance?

25. How does the meat of these hogs compare with those which have been corn-fed?

26. Is the "rendering" of the animal refuse done on the day in which animals are slaughtered?

27. Is any method of cooling the meat employed?

28. Give such facts, pamphlets, papers, or references as may bear on these subjects?

No slaughter-houses or abattoirs within the limits of the city of Bayonne, N. J.

SCHEDULE L.

Manufactories and trades of city of Bayonne, N. J.

1. Are there any manufacturing establishments within the city limits, or in the suburbs, which are nuisances, such as distilleries, chemical works, tanneries? If so, specify.

All the manufacturing establishments are located at Constable Hook, on the water front of Kill Von Kull, viz, C. T. Reynolds & Co., Color Works; F. Osgood & Co., Zinc and Acid Works; White's Sulphur Works; Standard Oil Company Refinery; Sea Board Refinery; and M. Kalbfleisch's Sons' Chemical Works.

2. Are any restrictions imposed upon such by law?

Provision made in charter, but no ordinance.

3. Are there any which pollute the water supply; if so, how?

No.

4. Have any bad results followed?

5. Are there any which produce noxious gases or vapors? If so, specify and state results.

6. Are there any which produce disease in the workmen? If so, specify.

Osgoods Acid Works discharge sulphurous gas, which produces sometimes most unpleasant effects to those living in the neighborhood, and to the workmen, of nausea, headache, difficulty of breathing, and other distressing symptoms.

7. Are women employed in the manufactories? If so, are they subject to any diseases due to their occupation, as from the use of sewing machines, &c.? If so, specify.

No women are employed.

8. What are hours for labor and meals in factories?

Ten hours per day; one-half hour at noon.

9. Are children employed in factories? If so, what are their hours of labor?

No children employed, except some boys fourteen years and over, in the barrel-yard of Standard Oil Company's works.

10. What is the age of the youngest so employed?

Fourteen years.

11. Does it affect their health? If so, specify.

No.

12. Is there any law regulating hours for labor of children, or requiring children employed to go to school a portion of the year? If so, furnish copy of such.

None, except the Revised Statutes of the State, page 1088, sections 103 and 104, requiring children to go to school at least twelve weeks in the year.

13. Are the cubic space and ventilation in the rooms occupied by workmen generally satisfactory?

Yes.

14. Have any diseases (or impaired physical condition) been observed, due to insufficient air supply to the workmen?

No.

15. Are the arrangements for privies and water-closets to these establishments satisfactory? If not, why not?

Yes.

SCHEDULE M.

Public school buildings of city of Bayonne, N. J.

1. How many public school buildings are in the city?

Five substantial brick buildings.

2. Are they properly located; if not, why not?

Yes.

3. Give for each building the following data: Location, altitude and area of site, nature of soil, character of drainage, material, date of erection, cost, number of stories, and number of rooms used as school-rooms.

The public school buildings in the city of Bayonne, N. J., are designated as follows: First ward, as school No. 1; Second ward (first district), as school No. 2; Third ward, as school No. 3; Fourth ward, as school No. 4; Second ward (second district, Constable Hook), as school No. 5.

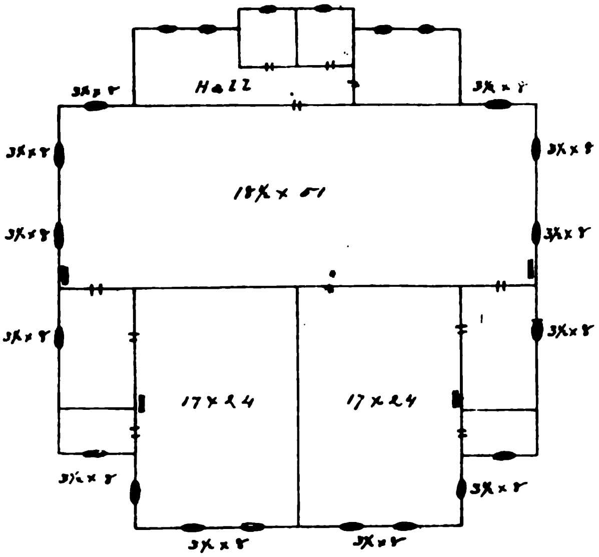
School.	Location.	Altitude.	Nature of soil.	Drainage.	Material.	Date of erection.	Cost.	Number of stories.	Number of rooms used as school-rooms.
		Feet.							
No. 1	5th street near avenue R.	30	Sandy	Sewer	Brick ...	1876	$21,000	2	6
No. 2	Avenue D between 30th and 31st streets.	30	Loom	Surface ...	....do ...	1870	20,000	2	6
No. 3	41st street between avenues C and D.	30	.....do	....do	....do ...	1870	20,000	2	5
No. 4	5th street between avenue D and Orient street.	20	.....do	Sewer.....	....do ...	1870	24,000	2	5
No. 5	27th street between avenues H and I.	30	Sandy	Surface	....do ...	1870	15,000	1	3

4. Give a floor plan for each floor, no matter how rough, if precise dimensions and height of each story is stated. Indicate all windows, doors, heating apparatus, and the number and position of scholars' desk, giving floor area and cubic space for each pupil.

See floor plan, &c., for each school appended to this schedule.

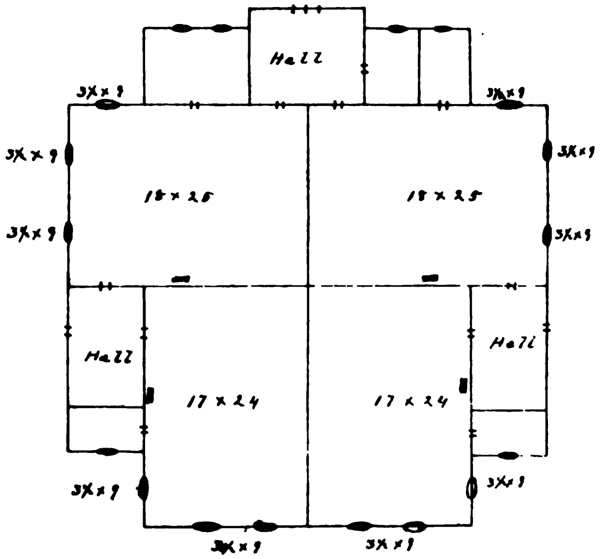
School No 1.

2 Floor

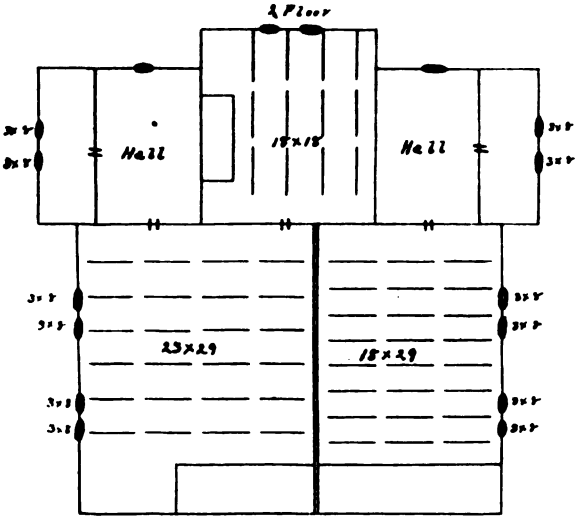


Ceilings 14 Ft

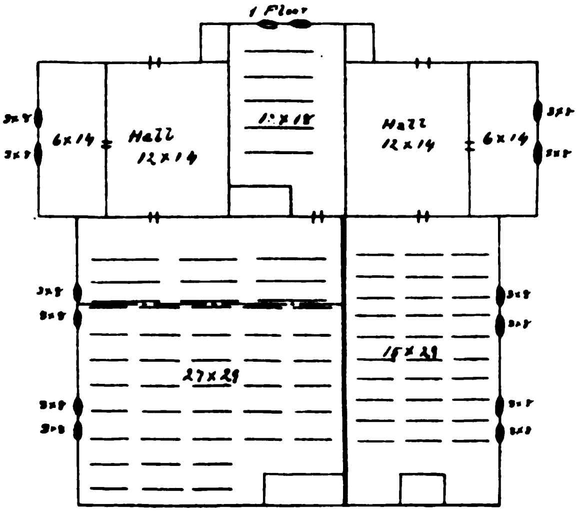
1 Floor



Schools No 2 & 8

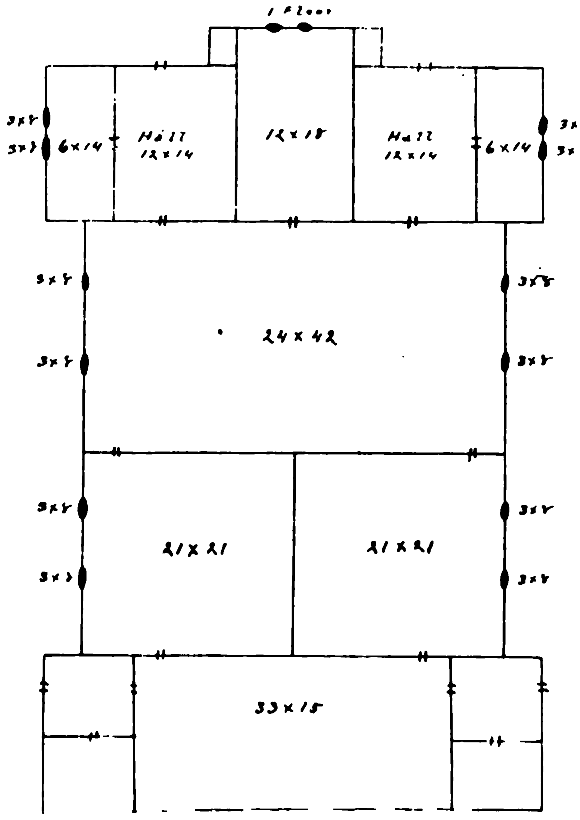


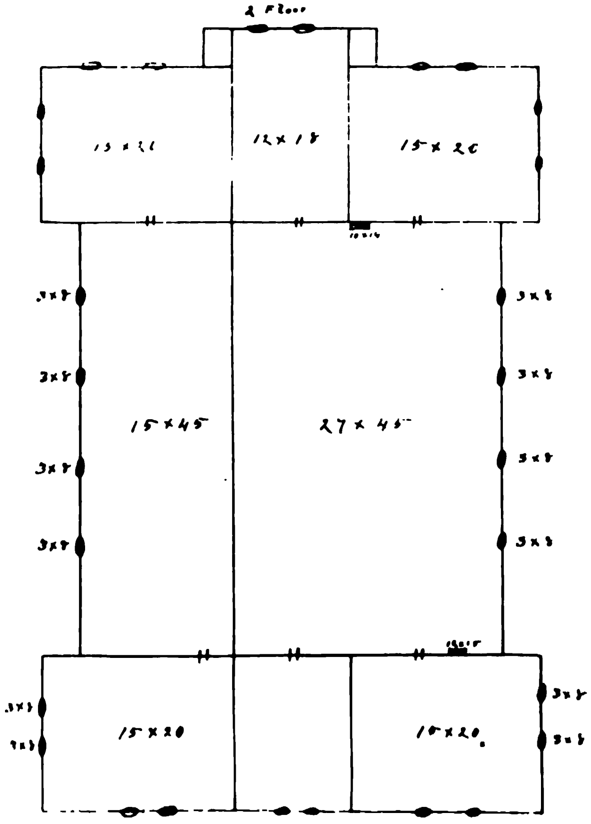
Ceilings 15 Ft



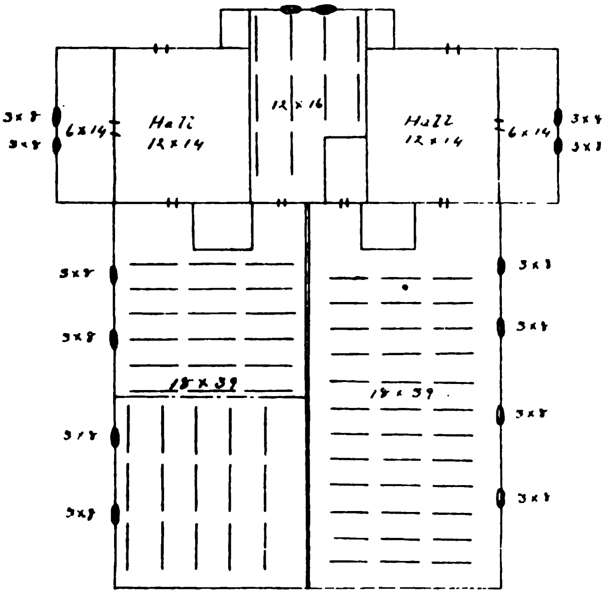
Ceilings 15 Ft

School No 4.





School No. 5.



Ceiling 14 Ft

5. How is the building heated?
By furnaces in the cellar.
6. What is the mean temperature of the rooms when the school is opened and half an hour before closing, in cold season?
No record is at present kept of the temperature, but principals are instructed to keep the mean temperature at 70° Fahr.
7. What is the mean external temperature for the same hours?
8. Is any sickness traceable to variations or extremes of temperature?
No.
9. How much fuel is required annually to heat the building?
About 90 tons are required for all the schools annually.
10. How are the school rooms ventilated in winter?
By ventilating flues and ventilators in the windows.
11. How are the school-rooms ventilated in summer?
By the windows.
12. Is the ventilation satisfactory?
Yes.
13. Give analysis of air during school hours, if possible.
14. What are the water-closet and privy arrangements?
Good: Nos. 1 and 4, water-closet in the yard, flushed by rain from roof, and connected to the sewer. Nos. 2, 3, and 5, privies in the yard; no sewer.
15. Are they satisfactory; if not, why not?
Yes.
16. Is the basement used for water-closets, earth-closets, for storing wood, or for what purpose?
Only for storing wood and coal.
17. Is the basement ventilated separately from the rest of the building?
Yes.
18. What is the water supply?
Wells.
19. Is it abundant?
Yes.
20. Please send results of latest analysis; if not analyzed, please state your opinion f its quality.
Quality good, except at No. 5 (Constable Hook).
21. What patterns of desks and seats are used?
Peard folding desk.
22. Are they satisfactory?
Yes.
23. Are the school-rooms sufficiently light?
Yes.
24. What is the number of square feet of surface through which light passes into ch room by windows?
See question No. 4; 3 by 8 feet.
25. Distance of pupils at recitations from the blackboard, maps, or charts, on which y are expected to read letters or figures?
From 10 to 25 feet.
26. Do the classes stand or sit during recitation?
Both.
27. Give a programme of each school day, showing division of time to the several dies, recitation, recesses, and intermissions.
Nine to 10.30 a. m., opening exercises and recitations; 10.30 to 10.45 a. m., recess; 45 to 12 m., recitations; 12 to 1 p. m., noon recess; 1 to 3 p. m., recitations.
28. How long are all the pupils under eight years old confined; 1st, in the room, to the seat without change?
In room about one hour at one time; in seat without change about 20 minutes.
29. Is your experience in favor of two sessions a day with one long intermission, or ly one session with recess?
Two sessions.
30. Are there opportunities for pupils to exercise, sheltered from the cold, heat, or t. and without exposure to air contaminated by privy or water-closet?
Plenty of room for outdoor exercise.
31. Are there opportunities for drying clothes when wet coming to school?
None except limited access to registers.
32. If any lessons are studied outside of the school hours, mention the subject so died, the average time required for the study of each, and the time of day usually oted thereto.
We do not care when the pupil learns his lesson, provided he have it ready at the hour recitation. We say but little about study outside of school-house.
33. Give the actual length of time devoted each day to outdoor exercise and recre-

ation, the number of holidays or half holidays in each week, the time of year at which the vacations occur, and the number of days in each vacation.

Answered in No. 27 in part. Every Saturday is a holiday. Thanksgiving, Christmas week, 22d February, Good Friday, the months of July and August, &c. (See manual.)

34. Describe the play-grounds, give the area thereof, and describe the gymnastic and calisthenic apparatus, if any used.

The area of the school play-grounds at school No. 1 is 220 by 75 feet; at school No. 2 is 158 by 167 feet; at school No. 3 is 150 by 170 feet; at school No. 4 is 180 by 150 feet; at school No. 5 is 100 by 168 feet. The boys and girls play-grounds are separated by fence—boys, girls.

35. Is exercise in the open air a compulsory feature of the institution?

No.

36. Is competition a feature in the system of instruction?

No. We offer no prizes.

37. If so, state fully to what extent it governs the award of prizes, whether different classes or both sexes may compete for the same prize; in this connection, state whether the sexes study and recite together or not.

Yes; together.

38. Is corporeal punishment permitted in the school?

No.

39. What methods of correction are used?

Moral suasion, demerits, report to parents, suspension and expulsion.

40. Mention what measures are taken for the care of the grounds, the flushing or other cleaning of sewers, the removal of excreta, &c.

The school buildings, yards, privies, and the removal of excreta are attended to by the janitors.

41. A copy of all regulations and statistics should accompany each report.

Manual herewith appended.

42. If statistics of the age, height, and weight of the pupils in each school or class are obtainable they are important.

43. Are there any statistics respecting the illnesses and deaths of teachers and pupils?

No.

44. Please state the results of your observations, experiments, and records respecting the prevalence of the following-named diseases and of any others of like character, and of the effect of the school-room furniture and building in promoting or modifying them:

a. Abnormitiis and diseases of the eye (short sight, color blindness, &c.).
b. Diseases resulting from cerebral congestion, (headache, epistaxis, goitre, &c.)
c. Diseases of the spine, (scoliosis, &c.)
d. Diseases of the respiratory organs, (consumption, scrofula, &c.)
e. Diseases of the digestive organs, (dyspepsia, &c.)
f. Diseases of the genito-urinary organs (especially females).
g. Contagious and epidemic diseases.
h. Wounds, injuries, &c.

None of the diseases have been noticed among our pupils.

45. Give your experience as to the effect of large schools on the propagation of disease, and as to the advisability, in a sanitary point of view, of very large school buildings of several (3 or more) stories in height.

We consider the school building should not be over two stories high.

46. State the frequency of heart disease among anæmic and debilitated pupils who occupy the upper floor of school buildings, and compare with the frequency among such pupils occupying the first and second stories only.

Our buildings are not over two stories.

47. State facts respecting the frequency of short sight among the pupils of the several ages and grades, and as to effect of defective light and improperly constructed desks and seats on this disease and on the production of spinal curvature, &c.

None.

48. Give your observations as to the safety of competition between pupils of both sexes; also as to the advisability of identical school hours, sessions, and lessons for both sexes.

SCHEDULE O.

Police and prisons of city of Bayonne, N. J.

1. Is the organization of the police force State or municipal?

Municipal.

2. What is the number of the police force?

Chief of police and eight patrolmen.

3. Do the members of the police force act as inspectors of nuisances?

Yes.

4. Is there a night patrol? If so, how many are on duty?

Yes; six on duty at night.

5. How many temporary lockups or station houses are there?

Two.

6. Are both sexes confined in the same institution?

Yes.

7. What is the average number of prisoners occupying each?

One and one-half temporarily.

8. What is the average daily number of prisoners occupying each?

9. What is the air space per head for such average occupancy?

Four feet by 20 feet by 9 feet.

10. What is it for the maximum occupancy?

11. What are the dimensions of the cells for single prisoners?

Nine feet long, 8 feet high, 5 feet wide.

12. Are the vagrants kept separate from the prisoners?

Yes.

13. How is the ventilation of the police station houses effected?

Open grated doors of iron and windows of same.

14. What are the privy arrangements?

Covered buckets, cleaned when used in outside water-closet.

15. What facilities, and what rules for bathing of the inmates?

None; allowed to wash in ante-room.

16. Are there any jails, penitentiaries or houses of correction within the city limits? If so, please state what they are.

None; the prisoners are taken each day to the county jail or penitentiary.

17. What industries and means to prevent indolence are provided?

Cleaning the station houses.

18. What is the average occupancy of each?

19. What are the dimensions of the single cells?

20. How are they heated and ventilated?

21. If ground plans of these institutions can be obtained, please furnish them.

22. Have any reports, and especially any medical reports of these institutions been printed.

23. If so, please give titles, dates, and place of publication.

24. Have any epidemics occurred among the prisoners? If so, specify.

25. What is the diet allowed prisoners?

26. What are the occupations of the prisoners?

27. What is the estimated number of houses of prostitution in the city?

None.

28. Has a license sytem been tried? If so, give particulars.

29. What is the estimated number of prostitutes?

30. Are they more or less subject to *general* disease than other women? If so, specify.

31. Are they required by law to be inspected?

32. How many places are there in the city at which intoxicating drinks are sold to be drunk on the premises?

Fifty-one.

33. How many of these are beer gardens or halls?

Forty-four beer saloons (44).

34. Give an estimate of the amount of malt liquors consumed in the city per annum.

About 10,000 barrels, ale and lager.

35. Give an estimate of the amount of distilled spirits, such as rum, whisky, &c., drunk per annum.

36. State the number of cases brought before magistrates or police courts for drunkenness during the year.

About 150.

37. Give any facts or statistics relative to the relation between the consumption of alcoholic drinks and the prevalence of disease?

38. Furnish copies of any State or municipal regulations with regard to the sale of intoxicating drinks.

39. To what extent are these regulations enforced?

AN ORDINANCE regulating inns and taverns, restaurants and beer saloons, restaurants, and beer saloons.

The mayor and council of the city of Bayonne do ordain as follows:

SEC. 1. The council may, by resolution, passed by at least a majority of concurring votes, and approved by the mayor, or by such action as becomes necessary in cases of non-approval by him of ordinances, or resolutions affecting the city, license any male inhabitant or inhabitants of the city of Bayonne to keep an inn and tavern, or to keep a restaurant and beer saloon, or either, where spirituous or intoxicating liquors may be sold, within said city, in the manner and upon the terms provided for by this ordinance. The yeas and nays, upon the passage of such resolutions, shall in all cases be recorded upon the minutes.

SEC. 2. No license to keep an inn and tavern, restaurant and beer saloon, or either, shall be granted, except upon the recommendation in writing of the party making application therefor, by at least ten freeholders, residing and owning real estate in the city of Bayonne, who shall not have recommended for license any other person, who at the time of the presentation of such recommendation is awaiting the action of the board of councilmen upon an application for a license: *provided*, that such freeholders, or any of them, shall not be themselves applicants for, or keepers of, an inn and tavern, or restaurant and beer saloon, or either.

SEC. 3. Every such license shall expire and be utterly void and of no effect on and after the first day of June next ensuing the date of said license; and where a license is granted to go into effect on the first day of June next ensuing, after the granting thereof, said license shall be dated and issued on said first day of June.

SEC. 4. The price of a license to keep an inn and tavern shall be seventy-five dollars, and for a license to keep a restaurant and beer saloon, or either, where spirituous or intoxicating liquors may be sold, the charge shall be fifty dollars. Each applicant for a license shall, at the time he hands in his application, deposit five dollars with the city clerk, which sum, if his license be granted, will be credited on the amount required by this section to be paid for said license.

SEC. 5. Every license to keep an inn and tavern shall be sealed with the corporate seal, signed by the mayor, and attested by the city clerk, and shall be in the words following:

Bayonne City, to wit:

The mayor and council of the city of Bayonne do hereby allow and license ———, of the ——— ward of the city of Bayonne, to keep an inn and tavern in the house (designating, describing it), from the date thereof until the first day of June next ensuing, unless sooner revoked, upon condition nevertheless that the said ——— shall, during said term, keep and observe all the laws of this State and ordinances of the city, and shall keep said inn and tavern closed up on the Christian Sabbath, except for the entertainment of travellers.

In witness whereof the corporate seal of the city of Bayonne is hereunto affixed, and these presents are signed by the mayor, and attested by the city clerk this —— day of ——— A. D. 18—.

And every license to keep a restaurant and beer saloon (or either, as the case may be), as aforesaid, and shall be in the words following:

City of Bayonne, to wit:

The mayor and council of the city of Bayonne do hereby allow and license ———, of the ——— ward of the city of Bayonne, to keep a restaurant and beer saloon (or either, as the case may be), where spirituous or intoxicating liquors may be sold, in the house (specifying and describing it), from the date hereof until the first day of June next ensuing, unless sooner revoked, upon condition nevertheless that the said ——— shall, during said term, keep and observe all the laws of the State and ordinances of the city; and shall keep said restaurant and beer saloon (or either, as the case may be) closed on the Christian Sabbath.

In witness whereof the corporate seal of the city of Bayonne is hereunto affixed, and these presents are signed by the mayor and attested by the city clerk, this —— day of ———, A. D. 18—.

SEC. 6. No license shall entitle any person to keep an inn and tavern, or restauran and beer saloon, or either, in any other place than that which is designated in said license; nor shall the same be assigned without the consent of the council of said city.

SEC. 7. The council may revoke or annul any such license which shall be granted, in case the person so licensed shall either personally, or by his agents, attorneys, or servants, offend against any part of this ordinance, or of any supplements hereto which may hereafter be enacted, or any law of the State of New Jersey, applicable to the sale of spirituous or intoxicating liquors.

SEC. 8. A true and correct list of all licenses which shall be granted by virtue of this ordinance shall be kept by the city clerk in a book to be provided for that purpose, which book shall be open to the inspection of all persons desirous to see the same, and which book also shall contain a full and correct record of all proceedings had in respect to each license granted.

SEC. 9. Every person licensed under the provisions of this ordinance shall cause his license to be kept in a conspicuous place behind his bar, in plain sight, under the penalty of twenty dollars for every neglect so to do.

SEC. 10. Every person licensed under the provisions of this ordinance to keep an inn and tavern, shall cause the name of the house where such inn and tavern shall be kept to be posted on some conspicuous part of said building; and the word "licensed," to occupy a space of not less than ten inches in length, shall be painted or exhibited on or about the main entrance, under the penalty of twenty dollars for every neglect so to do.

SEC. 11. Every person licensed under the provisions of this ordinance to keep a restaurant and beer saloon, or either, shall cause the words "licensed restaurant and beer saloon," "licensed restaurant," or "licensed beer saloon," as the case may be, to be placed on or at the main entrance on the outside of the building, under the penalty of twenty dollars for every neglect so to do.

SEC. 12. No person or persons shall, on the Christian Sabbath, on the first day of the week, commonly called Sunday, either personally, or by his agents, attorneys, or servants, sell, furnish, expose for sale, or cause to be sold, furnished, or exposed for sale any ale, cider, lager beer, or other beer or spirituous or intoxicating liquors of any kind, mixed or unmixed, in any place within the limits of the city of Bayonne, under the penalty of twenty dollars for each offense.

SEC. 13. No person or persons licensed to keep an inn and tavern as aforesaid, within the limits of the city of Bayonne, shall keep open such inn and tavern on the Christian Sabbath, or the first day of the week commonly called Sunday, except for the entertainment of travelers, and shall not permit on the day aforesaid any number of persons therein to congregate and cause disturbance, under the penalty of twenty dollars for each offense.

SEC. 14. No person or persons licensed to keep a restaurant and beer saloon, or either, as aforesaid, within the limits of the city of Bayonne, shall keep open restaurant or saloon on the Christian Sabbath, or first day of the week commonly called Sunday, under the penalty of twenty dollars for each offense.

SEC. 15. No person, whether proprietor or owner of an inn and tavern, restaurant and beer saloon, restaurant, or beer saloon, or clerk, agent, servant, or representative of the proprietor or owner thereof, or any other person, shall sell, or expose for sale, within the limits of the city of Bayonne, any ale, cider, porter, lager beer, or other malt liquor, or any spirituous or intoxicating liquor, or any mixed liquors, part of which is intoxicating (except licensed druggists and their clerks, upon the prescription of a practicing physician), in less quantity than one gallon, no part of which shall be drunk on the premises, unless the proprietor or owner of said inn and tavern, restaurant and beer saloon, or any other person, shall at the time of such sale or exposure for sale, be licensed as hereinbefore provided, and his license conspicuously posted behind the bar in plain sight, and the words "licensed," "licensed restaurant and beer saloon," "licensed restaurant," or "licensed beer saloon," as the case may be, be placed over or at the main entrance on the outside of the building, as hereinbefore provided, under the penalty of twenty dollars for each offense.

SEC. 16. The term restaurant and beer saloon, or either, shall not be taken and construed to mean a place where spirituous or intoxicating liquors are alone sold, but that the same be taken and construed to mean only such places where travelers may be supplied, at all proper times, with such meals, or food, as they may require.

SEC. 17. Any penalty arising under this ordinance may be recovered before the recorder of the city of Bayonne in the manner provided by the city charter and ordinances, which penalty, when recovered, shall be paid into the city treasury; and it shall be the special duty of the constables and policemen of the city to make complaints to the said recorder, of the violations of any of the provisions of this ordinance.

SEC. 18. The city clerk shall be paid one dollar and fifty cents for drawing each license, which shall be paid by the applicant therefor when the license is delivered.

SEC. 19. Nothing in this ordinance contained shall be construed to grant permission to any person to exercise any of the privileges granted under a license until the license shall be first had, obtained, and displayed, and if said license be not paid for and taken by the applicant therefor within thirty days from the date when the license was granted, upon the expiration of the said thirty days it shall become null, void, and of no effect.

SEC. 20. Immediately upon a license as aforesaid being granted, it shall be the duty of the city clerk to make the same out and have it properly executed, and to place it in the hands of the collector of revenue, who upon receipt of the price thereof as prescribed by this ordinance and of the fee allowed to the city clerk for making out said license, from the person to whom the same was granted, shall deliver the same to him. If the license be not paid for and taken out by the applicant therefor within thirty days from the date when the same was granted, the collector of revenue shall return the same to the city clerk, who shall notify the council of the same at its next regular meeting.

SEC. 21. All ordinances and parts of ordinances regulating inns and taverns, restaurants and beer saloons, and the various supplements thereto, heretofore enacted, are hereby repealed.

Passed April 24, 1877.
Approved April 26, 1877.

HENRY MEIGS, *Mayor*.

Attest:
W. C. HAMILTON, *City Clerk*.

SCHEDULE P.

Fire establishments, &c., of the city of Bayonne, N. J.

1. Is your fire establishment organized under State or local law? Give copy of the law.
Local.
2. Is your fire establishment voluntary or paid?
Volunteer.
3. What are the laws, regulations, and practices concerning the storage of gunpowder, nitro-glycerine, and coal oils?
4. What are the laws with regard to buildings, in reference to fire?
5. What measures are taken to insure complete inspection of illuminating oils?
6. What is the number of steam fire-engines?
None.
7. What is the number of hand fire engines?
Two—one water engine, one chemical engine.
8. What is the number of hook and ladder trucks, hose carriages, &c.?
Two.
9. Have you any floating engines, or steamers with special fire pumps?
None.
10. Whence is your water supply for fire purposes? Is it abundant, and how is it distributed?
Wells and cisterns and the Kills and New York and Newark Bays.
11. Are "fire extinguishers" in general use?
Each hook and ladder truck has several small extinguishers.
12. What patents, or kinds, of fire extinguishers are most in favor?
Champion and Babcock.
13. What is the annual expense of your fire establishment?
Eight hundred dollars.
14. What number of persons employed in your fire department?
One hundred and twenty.
15. What number of hours are the firemen on duty?
16. What is the manner of berthing and subsisting the men on duty?
17. What per cent. of sick-days among paid and disciplined firemen?
18. What proportion of accidents in line of duty?
None.
19. What proportion of mortality in line of duty?
None.
20. Is there a medical man connected with your fire establishment?
None.
21. Are his services given by contract or otherwise?
22. About what proportion of diseases and accidents are found among your volunteer firemen incidental to their service?
23. What is the general character of your volunteer firemen for discipline, efficiency, and sobriety?
Good.
24. Have you an insurance patrol for discovering fires and saving property?
None.
25. What loss of life from fire in the past year?
None.
26. What loss of property from fire in the past year?
About $20,000.
27. What number of fires, in the past year, arose from dangerous and unfit fluids for lighting purposes?
28. What number from carelessness, such as defective construction, smoking, matches, fireworks, &c.?
29. What number from spontaneous combustion of oiled cotton waste, &c.?
30. What number incendiary?

31. Have you a fire-alarm and police telegraph? What system?
None.
32. What proportion of alarm boxes to area protected?
33. Does the system thoroughly answer its purpose?
34 Have you an ambulance system in connection with your fire department and telegraph, for conveying wounded and sick to hospital?
No.

HENRY D. KEMAGHAN,
Chief Engineer.

AN ORDINANCE to regulate and control the fire department of city of Bayonne.

The mayor and council of the city of Bayonne do ordain as follows:

SEC. 1. That the fire department of this city shall consist of one chief engineer, a first and second assistant engineer, and as many engine men, hook and ladder men, horsemen, and bucket men, as are now, or may hereafter become lawful members of fire companies established by the said city. No person shall become a member of the fire department over the age of fifty nor under the age of twenty-one years, and must be an actual resident of this city.

SEC. 2. The members of each and any company established by the city shall from time to time elect suitable persons (not exceeding the prescribed number) to fill all vacancies there may be now, or that may occur in their several companies, subject to approval of the council. Such persons shall be furnished with certificates by the city clerk, signed by the mayor, and thereafter be considered members of the fire department during the pleasure of the council.

SEC. 3. On the first Monday in January of each and every year, there shall be an election held by the various fire companies aforesaid for one chief engineer, a first and second assistant engineer, who shall be residents of different wards of said city, and who are at the time of election members of different fire companies of the said city. Each company shall hold said election in their respective houses (or regular places of meeting), polls to be open three hours in the evening of said Monday between the hours of seven and ten p. m. All votes given for chief or assistant engineers shall be by written or printed ballot, containing the name of the person voted for, also designating the office for which he shall be elected, and the person receiving the largest number of all votes so cast, by the members of the various companies of the city, shall be elected to their respective offices, subject, however, to confirmation by the council. In the event of a tie vote, at any election aforesaid, for chief or assistant engineers, the council shall appoint a person or persons to fill the office or offices till the next annual election.

SEC. 4. The chief and assistant engineers shall severally continue in office for one year, and until their successors are elected and confirmed (unless sooner removed by the council) in which case the council shall appoint a person or persons to fill the vacancy till the next election.

SEC. 5. The chief engineer in all cases of fire or alarms of fire, or threatened damage or destruction of property in consequence of fire, shall have, when present, the sole and absolute control and command over all the persons attached to the fire department, or any other company, or persons allowed to do fire duty. He shall direct their operations so as most effectually to prevent the destruction of life and property, using all the means of the department to this end. He shall have also power to call out once in every year all persons belonging to the fire department for review and inspection.

SEC. 6. The assistant engineers shall at all times assist the chief engineer in the performance of his duties and obey his directions and commands when on duty at a fire or alarm of fire. In case of absence, or disability of the chief, then the first assistant in case the fire or alarm of fire occurs in his ward, and the second assistant in case it occurs in his ward, shall act in the stead of the chief engineer, and be clothed with all the powers and responsibility of the chief.

In case a fire or alarm of fire occurs in other wards than above (in absence of the chief), then either assistant present shall take full charge till arrival of his superior officer, who then shall assume command in place of the one then acting.

SEC. 7. The chief engineer shall devote such time and attention to the discharge of his duties as shall be necessary, and shall receive no compensation therefor, directly or indirectly, from the city. He shall examine once in every month, and oftener if necessary, all the engine houses, engines, and other apparatus, and properties belonging to the city, and shall keep a record of such examinations, and of the condition in which the said properties were found at the time, and shall report same every three months to the council, with date of said examination, also the number of fires which have occurred during the time, and amount of loss by fire or otherwise, as near as can be ascertained, with any recommendation he may deem necessary and proper for further effecting the usefulness or efficiency of the fire department.

SEC. 8. The chief engineer shall order, direct, and superintend all ordinary repairs to engine houses, engines, and other apparatus, and shall examine and certify all accounts for such repairs. It shall be his duty to keep on hand a proper supply of all articles needed by the various companies at their respective houses, and shall have power to procure such supplies, or make such repairs, or alteration, when the amount does not exceed the sum of ten dollars.

SEC. 9. He shall also keep in his book a record of all fires and alarms of fire which may happen in this city, with the cause thereof, when same can be ascertained, and the description of the building, or buildings injured or destroyed, and shall report at the close of every year names of all members of the department and the company to which they belong.

SEC. 10. It shall be the duty of the chief or assistant engineers to cause order to be observed by the members of the fire department in going to, working at, or returning from a fire, or an alarm of fire, and at all other times when they are on duty. If any member of the fire department refuses to obey all proper orders of the chief or assistant engineer, or refuses to assist at a fire, he shall be subject to a penalty of ten dollars.

SEC. 11. All complaints by the chief or assistant engineers, against firemen for misconduct in the performance of their duty, shall be forthwith reported to the council for their action, and any officer or member of the fire department complained of as above may be suspended by a majority vote of his company until final action of the council on the subject of such complaint.

SEC. 12. The members of each fire company of the city shall elect once in every year, from their own number, a foreman and two assistant foremen, a secretary, and treasurer, and such other officers as they may deem proper. They shall also have power to make their own rules, and by-laws, not in conflict with charter or ordinances of our city, and each company, by a vote of the majority of its members, shall have power to expel any member for disorderly conduct, or neglect of duty, subject to approval of council. The secretary of each company shall promptly send in writing to the council the name of every person who is elected or dismissed, or may die, or resign from the various companies, and in case of dismission the cause shall be stated in full.

SEC. 13. It shall be the duty of the foreman of each company, to see that his engine, or apparatus, are kept clean and in good order, and shall report to chief, or assistant engineers, immediately, any repairs or supplies needed by his company. It shall be his duty to see that the engine houses are not defaced, or injured, and that the houses are not used as a place of resort, or loitering, or social gathering. It shall be his duty to see that each and every member of his company, are supplied with the proper badge, and he shall be responsible for return of same, when any person ceases to be a member of his company.

SEC. 14. It shall be the duty of every company to obey the directions and orders given them by the chief engineer, or assistant engineers, and when a fire is extinguished they shall not remove therefrom, but by the permission of the engineer then in command, and on such permission, they shall return at once to their respective engine houses.

SEC. 15. Each member of the fire department of this city, shall provide himself immediately with the proper badge, and shall wear the same, conspicuously displayed, at every fire, in order that he may be readily distinguished as belonging to this fire department. If any member of the fire department of said city shall be found wearing the badge of another member, or shall at any time, lend his own badge to any person, he shall be subject to a penalty of ten dollars, and also be liable to suspension or expulsion from the department, by the council.

SEC. 16. The badge mentioned in the preceding sections shall be made of German silver, bearing the words "Bayonne Fire Department"; each badge shall bear a distinct number in raised figures thereon, of brass metal; said badge shall be struck from a metallic die, which shall be the exclusive property of the city. All badges shall be placed in the custody of the chief engineer, to be delivered as required to the foremen of the respective companies, and returned again to chief engineer, when any person ceases to be a member of the department.

SEC. 17. Each and every member shall be required to deposit the sum of fifty cents with the chief engineer, upon the delivery of said badge to him, which shall be repaid to the depositor upon the return of the badge to the chief in good condition, at any time after he shall have ceased to be a member of the department. All such badges shall be the exclusive property of the city.

SEC. 18. The chief engineer shall keep in his book a register of the badges so delivered, with the number of said badge, and the name of the person to whom delivered, and shall credit each depositor with the sum paid, and charge the said sum to each person to whom it shall be returned. He shall, once in three months, report to the council the number of badges delivered and returned, as aforesaid, and the amount of money so deposited and so returned, and shall pay over to the City Treasurer the balance of such moneys remaining in his hands, if any, at such time.

SEC. 19. It shall be the duty of all firemen, as often as any fire shall break out in this city, or upon an alarm of fire, to repair immediately to their respective engines or apparatus, and convey the same to the place where such fire, or alarm of fire, shall happen. They shall obey the orders of their foreman and the by-laws of their company.

SEC. 20. No person, or persons, other than the members of the department, shall be permitted to have access to the houses of the respective fire companies. No person or persons, except the members of the company, and persons accompanying them, shall be permitted to enter any of the engine houses, hook and ladder, or hose houses in the city, or to handle, or meddle, or disturb any of the fire apparatus, without permission from an engineer or foreman; but the foregoing provision shall not be deemed to apply to the mayor, members of the council, or persons accompanying them, or those they may send, or to any police officer in discharge of his duty.

SEC. 21. No member of the fire department of the city, shall use the engine, or hook and ladder, or hose houses of the city as places of resort, or loitering, nor for any social gathering; neither shall there be at any time any card playing, or game, or games, of any kind whatsoever, within said buildings, under a penalty of twenty dollars for each and every offence, to be collected of each and every member, person or persons found so violating this section of this ordinance.

SEC. 22. Every member of the fire department shall receive a certificate of membership, duly executed and signed, and the commencement of the term of service of each person, approved by the council as a member of the department, shall be computed from the date of such certificate of membership, and shall be entitled to all exemptions and privileges provided by law, and upon serving the term of seven years consecutively shall be entitled to receive a certificate as an exempt fireman, and same shall then be delivered to him, upon proper application therefor, and upon payment of one dollar into city treasury.

SEC. 23. Any person who has been expelled from any fire company, and whose expulsion has been confirmed by the council, shall not be allowed to join any other company, unless reinstated by a vote of two-thirds of the actual members of the company from which he was expelled, also the confirmation of the council.

SEC. 24. No fire apparatus of any kind shall be let out for hire, or loaned in any case without permission in writing from the council. No engine, hose or hook and ladder house shall be used any time or for any purpose other than housing its apparatus, or the meeting of the company, without permission from the council; *provided*, that nothing contained in this, or preceding sections, shall be construed to interfere with the use of said rooms for election purposes, if the council decide to have them used on such occasions.

SEC. 25. It shall not be lawful for the members of any engine, hook and ladder, hose, or other company belonging to the city, or otherwise, when returning from a fire, or an alarm of fire, to draw any machine or apparatus to which they may be attached, faster than by walking with the same; and it shall be the duty of the foreman or the assistant foreman of each company alluded to above to prevent their members from violating this section of the ordinance. Any and every officer, or any and every member of the fire department of this city, or any and every officer, member, or persons connected with, or belonging to, any other fire company, found violating this section of this ordinance, or detected in any conduct that may likely cause a breach of the peace, or would tend to reflect discredit on the fire department, shall forfeit and pay to the city the sum of five dollars for each and every offence. Any engineer or assistant engineer, any foreman or assistant foreman, belonging to the fire department who shall not report such violation to the council, be it in his or any other company, shall be liable to be removed by the council.

SEC. 26. When the chief engineer shall report to the mayor that there are good and sufficient grounds of suspicion that any fire within said city has been caused by design, it shall be lawful for the mayor to offer such reward as he may deem advisable, not exceeding the sum of five hundred dollars for the discovery and apprehension of the incendiary, to be paid only on the conviction of the person or persons so offending.

SEC. 27. That the complement of men allowed each hook and ladder company shall be forty, each engine company forty, and each hose or bucket company thirty, and the number shall not be increased or diminished except by consent of the council.

SEC. 28. Nothing contained in this ordinance shall deprive the council at any time of the power to disband any and all companies belonging to the fire department of this city.

SEC. 29. All fines and penalties prescribed in this ordinance or in any section thereof, shall be recovered before the recorder elected and residing in this city, in the manner provided by law, and the forfeiture so recovered shall be paid to the city treasurer.

SEC. 30. All previous ordinances or parts of ordinances relating to the fire department be and they are hereby repealed.

Passed March 27, 1877.
Approved March 30, 1877.

HENRY MEIGS, *Mayor.*

Attest:
W. C. HAMILTON, *City Clerk.*

SCHEDULE R.

Public health laws, regulations, sanitary officials, of the city of Bayonne, Hudson County, N. J.

1. Name of board of health.
Board health, city of Bayonne.
2. Bounds in which its authority is exercised.
Bayonne City.
3. When organized.
June 29, 1869.
4. Is it a special board of health, or is it the board of aldermen, or other public body, acting *ex officio* as such?
Special.
5. Give present health ordinances.
See ordinances 1872 and 1879.
6. By whom is the board selected, and on what recommendations?
The board is composed of the mayor, president of the council *ex officio*, health physician, and commissioner of health of council.
7. Number of members of board.
Six.
8. Term of office of members.
Yearly.
9. What amount of salary to members?
None.
10. What proportion of the board are physicians?
One.
11. Has the board an executive health officer?
Yes.
12. Is he a physician?
Yes.
13. Is the chief health officer selected by or from the board, or how is he appointed
By the board.
14. What number of assistant health officers has the board?
One.
15. What number are physicians?
One.
16. Have any or all the assistants police powers?
Yes.
17. Do they make inspections unless when there has been complaint?
Yes.
18. How often does the board meet?
Monthly.
19. Does the board derive its powers from State or city?
City.
20. Are the powers of the board specifically defined or limited by law?
Specifically.
21. Has the board authority independent of city councils and police to make and enforce ordinances?
No.
22. Has it such authority at all times, or only in time of declared epidemic?
In time of epidemic.
23. Has the board authority to abate, or only authority to define nuisances?
To abate.
24. To what extent does the board take cognizance of defective house draining?
Order abatement when ascertained.
25. Of defective sewerage?
Same.
26. Of possible contamination of water supply, public or private?
Same.
27. Of the condition of cesspools and privy-vaults?
Same.
28. Of the removal of garbage and cleansing of private premises?
Same.
29. Of the condition of streets as to cleanliness?
Same.
30. Of methods of burial?
Permits obtained from health inspector.
31. Of the ultimate disposal of night-soil and organic wastes?
No.
32. Of the fouling of adjacent water-courses, harbors, &c.?

No.

33. Are small-pox patients isolated?

Yes.

34. Has the board power to remove persons sick with contagious diseases to special hospital?

Yes.

35. If so, does it always do it?

Yes.

36. Is vaccination compulsory?

No.

37. What other requirements respecting vaccination?

None.

38. What measures are taken by the board to restrict contagious and infectious diseases?

See ordinance.

39. What vital statistics does the board register?

Marriages, births, and deaths.

40. Does the mortuary report show street, block, number of house?

Have no numbers, but shows street, block and ward.

41. How do the births, marriages, and deaths, respectively, become matters of record?

Reported to health inspector, who keeps record.

42. How often does the board regularly report causes of mortality and records of death?

Quarterly.

43. To whom does the board report?

Local papers.

44. In what form is the report published?

Same.

45. With how many similar boards does your board of health exchange its annual or other reports?

None.

46. In what other manner does your board contribute to or receive aid from the labors of sanitarians outside of your own board?

No direct assistance.

APPENDIX I.

Report of the committee charged with making a sanitary survey of Memphis, Tenn.

WASHINGTON, D. C., *March* 1, 1880.

At the meeting of the National Board of Health, October 13, 1879, it was decided that a sanitary survey of the city of Memphis should be made, and a special committee of the board, consisting of Drs. J. S. Billings, H. A. Johnson, and R. W. Mitchell, was appointed to take charge of the matter.

This committee was authorized to have made a house-to-house inspection, provided this was agreed to by the authorities of the city, and to employ two experts. It was also directed to visit Memphis at the close of the November meeting of the board.

On the 21st of October the following resolution was received from the State board of health of Tennessee:

"Whereas proper sanitation, having for its object the promotion of the public health as applied to cities, can only be accomplished through the means of a thoroughly systematized and comprehensive plan, and the city of Memphis is now in such a condition as to demand the early adoption of a plan for future operations relating to its permanent sanitation; and

"Whereas the geographical position of Memphis and her relations by commercial intercourse place that city in a situation to imperil, in times of pestilence, the health of the whole Mississippi Valley; and

"Whereas neither the authorities of Memphis nor the board have the means at hand necessary to the accomplishment of this work: Therefore,

"*Be it resolved*, That the co-operation of the National Board of Health be requested for the purpose of making a thorough and complete sanitary survey of the city of Memphis at as early a date as possible, after the close of the present epidemic of yellow fever, with the view of indicating what conditions exist favorable to the production and spread of disease, and what measures should be adopted for their removal, with the methods of their accomplishment and the estimated cost of the same.

"Adopted at the quarterly meeting of the Tennessee State board of health, held October 7 and 8, 1879."

In accordonce with a request made by the National Board, Hon. John Johnson, of Memphis, member of the State board of health of Tennessee, was designated to represent that body, and to aid and counsel with the committee having charge of the survey.

On the 30th of October a telegram was received from Hon. D. T. Porter, president of the taxing district of Shelby County, asking the National Board to make a complete sanitary survey of the city as soon as practicable, in reply to which he was informed of the action of the board, and was requested to give such assistance toward making the examination complete and accurate as might be in his power.

At this time yellow fever was still prevailing in the city, and it was useless to undertake any house-to-house inspection or survey at that time, since the great majority of the inhabitants were absent and their houses were closed. The necessary blanks for the house-to-house inspection were, however, prepared after an examination of a number of blank forms of a similar character. The form decided on measures 7 by 9 inches, and is as follows:

No.—. NATIONAL BOARD OF HEALTH. 1879.

SANITARY INSPECTION OF MEMPHIS.

1. Ward ——, street ——, No. —.
2. Owner or owners, ——.
3. Area of lot, ——; of house, ——; out-houses, ——.
4. Age of house, ——; material, ——; No. of stories, ——.
5. Cellars and basement, ——.
6. Rooms and passages, ——.
7. Sinks, drains, and cesspools, ——.
8. Privies or water-closets, location and condition, ——.
9. Yards, ——.
10. Hogs or other animals, ——; fowls, ——; No., ——; where kept, ——.
11. Public nuisances on or near premises, ——.
12. No. of families in house, ——; names of heads of families, ——; No. of persons in each, specifying No. of whites and blacks, ——.
13. Sickness now in house, ——; what diseases, ——.
14. Any sickness during past year, ——; what diseases, ——; No. of cases ——.
15. Any deaths during past year, ——; what diseases, ——.
16. Water-supply, sources of, and sources of contamination, ——.
17. Presence of possibly infected material, ——.
18. Sanitary needs and estimated cost, ——.

The above is correct as personally examined by me this —— day of ——, 18—.
Refer to directions often.

——— ———,
Inspector.

Fifty such sheets were put together, forming a memorandum-book, on the back of which was printed the following

"DIRECTIONS:

"The figures below refer to the corresponding numbers on the other side. (See above.)

"1 and 2. Give the exact and full name of the owner or owners of the estate. Give the street and number, and describe the location so that it cannot be mistaken.

"3. Give dimensions of sheds, privies, stables, &c., with their relations to living-rooms.

"5. Examine cellars very carefully, and describe their condition, particularly with regard to dampness, amount and kind of filth, ventilation, &c.

"7. Is there any offensive smell from the sinks? Are the pipes or spouts water-tight? Are there any traps to prevent foul air from coming into the rooms? Are the spouts broken, leaky, and filthy? Are the sink-drains clogged or uncovered? Are the cesspools tightly covered and clean? Do the cesspools leak into the cellar or into the well?

"8. Privies and vaults: Describe their condition particularly. Are they full or running over? Are they filthy? Is the vault tightly covered? Do they smell badly? Do the vaults need emptying?

"9. Describe particularly the kind and amount of all heaps of filth about the premises, and the general condition of the yards.

"11. Public nuisances, as sewers, stables, offensive manufactories, &c.

"12. Note overcrowding.

"13, 14, 15. Inquire particularly.

"16. State whether, in addition to the supply from water-mains, water is used from a well or cistern; whether it is called good or bad; whether any filth probably drains into the well, &c.

"17. Note bedding, wearing apparel, and upholstered furniture, and whether disinfection has been performed in the house.

"Give any other information and make such suggestions as may occur to you on the back of the form, referring, when necessary, to the numbers. Give all descriptions in as few words as possible, but be clear and definite."

It is considered that this form is more convenient for the purposes of such an inspection as the committee desired to make than any form of memorandum-book to be carried in the pocket. It was found that a very excellent contour map for the greater portion of the city had been prepared by Mr. Charles Hermany, the engineer in charge of the water-works at Louisville, Ky., in connection with a report made by him to the city proposing a system of sewerage and water supply in the year 1868, and after examination of this map it was not considered necessary to have any further work done in this direction for the purposes of the survey.

As soon as the epidemic had ceased and a majority of the citizens had returned to their homes, the house-to-house inspection was commenced under the immediate direction of Dr. R. W. Mitchell, the resident member of the board.

At the close of the meeting of the National Board of Health at Nashville, Tenn., November 22, the committee met in Memphis, having associated with it Maj. W. H. H. Benyaurd, United States Engineers, detailed by the War Department as consulting engineer in accordance with the request of the board; Dr. C. F. Folsom, secretary of the State board of health of Massachusetts; George E. Waring, jr., and Dr. Charles Smart, United States Army, who had been specially detailed for the purpose of making analyses of the water supply.

After a general survey of the city and obtaining information and suggestions from the authorities and principal citizens of the place, and after an examination of the results of so much of the house-to-house inspection as was then completed, the committee prepared a preliminary report, and in view of the urgency of the case and the importance of prompt action, furnished a copy of the same, with their recommendations, to Governor Porter, authority to furnish such report having been granted by the board at the Nashville meeting. A copy of this preliminary report is given in No. 24 of the Bulletin.

The recommendations of the committee were as follows:

First. That measures be at once taken to secure proper superintendence and subsequent care of the sanitary work to be undertaken by the city. This will involve, among other things, the employment of a trained and thoroughly competent sanitary officer, and it is absolutely necessary that such intelligent superintendence and care shall be provided and continued, if good results are to be obtained from any comprehensive system of municipal sanitation. There is a large amount of sanitary work to be done in Memphis, the details of which must be left, to a great extent, discretionary, in order to secure the best results without unnecessary expense; but this discretionary power should be intrusted only to a competent health authority, independent of politics, and, unless it be provided, we do not think that the efforts of the authorities and citizens of Memphis to make it a healthy city will be successful.

Second. That as soon as possible there shall be carried out a methodical and thorough system of opening, ventilating, and chilling all the houses in the city, whether occupied or unoccupied. This should be done in such a manner as to secure the exposure to currents of fresh cold air, for at least twenty-four hours, of all rooms, cellars, closets, interior of trunks, boxes, bureau drawers, &c., and also of bedding, carpets, clothing, &c.

In this connection it is also recommended that all rags, bedding, material for mattresses, and articles of a similar nature now collected in the junk-shops of the city, or which may be found elsewhere under circumstances which would cause the presumption of their infection, should be at once collected and destroyed by fire.

Third. That it is important that the city should have control of the water-works, at least to such an extent as to insure a change to the present source of supply, and also to insure that a sufficient amount of water for sanitary purposes shall at all times be at the disposal of the city. The water supply should be taken either from the Mississippi River, above the point of entrance of Wolf River, from a deep-lying, pure water-bearing stratum, if such can be found, or from a distant inland source.

The use of all polluted cisterns and wells should be at once discontinued.

Fourth. That a large number of houses in the city should be condemned, torn down, and the material destroyed by fire. This will include not only foul shanties and cabins, but some large buildings in the heart of the city.

Fifth. That all privy vaults now in the city should be cleaned out and filled with fresh earth, and that hereafter no system of dealing with excrement shall be permitted which involves pollution of soil, water, or air. In those portions of the city so thickly settled as to warrant it, there should be introduced a system of sewers to discharge into the Mississippi River upon a plan substantially as recommended by Colonel Waring. This plan excludes rain-water and subsoil water from the sewer and makes use of eathern pipes instead of brick, the dimensions of the pipes being so regulated as to secure a constant flow, which, at the maximum, shall not more than half fill the pipe at any point. The pipes are to be flushed at regular intervals with clean water from the city water supply, by means of a system of flush-tanks. These recommendations include a system of subsoil drainage, discharging into the bayous and into the river.

The total cost of these systems of sewerage and subsoil drainage is estimated at $225,000.

The connection of houses with this system of sewerage should be under municipal control, and in accordance with specifications to be prepared by the sanitary authorities. Public urinals and water-closets to connect with the sewers should be provided. The city should take charge of the removal of excrement from all premises not connected with sewers, and should insure, by frequent and trustworthy inspection, the proper condition of the receptacles so used. In those houses which are to be connected with the sewers, and in which the privy vaults are discontinued, there should be used in the interval between the closing of the vaults and the making connection with the sewers some simple form of frequent dry-earth removal.

Sixth. That the bayous, with a sufficient strip of ground on each side to insure their control and freedom from pollution, should be made the property of the city for securing drainage and as a public park, the banks being properly grassed and a constant stream of clear water being secured. The backing up of high water from the river into the bayou should be prevented by means of a dam, in connection with which must be provided pumping machinery, to dispose of the ordinary flow during such period of high water. This pumping would not generally apply to the storm-water falling on the surface of the city, since the plan of surface drainage includes an intercepting surface gutter on each side of the bayou, carrying over the top of the dam the water of all ordinary storms. The total cost of the dam and pumping apparatus is estimated at $3,500.

Seventh. That a system of building regulations shall be enacted and enforced, providing that no buildings shall be hereafter erected in the city unless the plans have been approved by the sanitary authority, and that the construction shall also be subject to its inspection and approval. All uncondemned buildings whose lower floors are less than two feet from the ground should be raised to that height as early as possible; and in future all dwellings should be built with their lower floors at least two feet from the ground; also, that all cellars and basements should be freely ventilated. All this should be enforced by municipal authority.

Eighth. In this brief report no recommendations are made with regard to many important points in municipal sanitation, such as the system of removal of garbage, slop-water, dead animals, and refuse; the regulation of markets and slaughter-houses, hospitals and public charities, public baths, cemeteries, school-houses, &c.—in part because the detailed inspections on these points are not yet completed, in part because these are largely matters of detail, requiring the constant supervision of the competent and sanitary authority urged in our first recommendation; and the providing such authority is the best means of insuring that all these things will receive due attention. The existing regulations requiring the reporting of all cases of contagious and infectious disease, and also the requiring of burial permits, should be strictly enforced.

Ninth. With the exception of those devoted to heavy traffic, it is advised that all streets should be constructed of Paducah gravel, laid on a properly shaped road-bed, after the subsoil drains have been established, and that the gutters and curbs should be made of concrete.

Since the visit of the committee, Dr. F. W. Reilly, who had been appointed inspector in charge and assumed the duties of that position November 22, has, in accordance with the instructions of the committee, vigorously pushed the house-to-house inspection, and this was completed early in January.

A copy of Dr. Reilly's report and a summary of the sanitary history of Memphis, Tenn., prepared by him, is herewith submitted.

In connection with this there is also submitted a report of Dr. Charles Smart, U. S. A., on the analyses of the water supply of certain towns of Mississippi and Tennessee, and more especially of the city of Memphis. It will be seen from these reports that the report of the results of the inspection of one ward of the city, upon which the committee based the recommendations contained in their preliminary report of November 27, gave a fair sample of the condition of the entire place, and it is not probable that the recommendations of the committee would have been materially different in any respect had they had at that time the entire data which are now presented. As the house-to-house inspection proceeded, Dr. Reilly, in accordance with the instructions of the committee, has furnished to the authorities of the city lists of the principal nuisances discovered, giving their precise location and character.

The recommendations contained in the preliminary report of the committee were approved by the executive authorities and by the committee of citizens of Memphis, who petitioned the governor to call a special session of the legislature to grant to the taxing district the necessary authority to levy a tax to carry out the work thus recommended.

Accordingly the legislature was called and passed an act authorizing the levying of a tax of two per cent., one-half to be collected in February and one-half in November.

In the mean time the legislative council had passed an ordinance directing the immediate emptying and filling up with fresh earth of all privy vaults in the city. This met with considerable opposition, and the result was that the ordinance was finally modified to read as follows:

"SECTION 1. *Be it ordained by the legislative council*, That so much of the health ordinances. sections 258*a* to 258*e*, inclusive, p. 1245 (Heiskell's Digest), as require the filling up of all privy vaults, and the carrying away of excrement at the occupant's or owner's expense, be, and the same is hereby, modified, and shall have force as follows: There shall be appointed by this council and the board of health, inspectors of vaults, who shall each at once proceed to inspect every privy vault and water-closet, in the respective districts assigned them, and where in his or their opinion the same, or any of them, are in unsanitary condition, the inspector shall at once condemn the same as a nuisance, and notify the occupant or owner of the premises, where such privy vault or water-closet is, to clean out, disinfect, and fill up the same within ten days thereafter: *Provided, however*, When such occupant or owner is so notified, if he feels aggrieved by such action, he may petition the fire and police commissioners, within two days after said notice, to have a committee of three citizens, to be appointed by the president, to visit and inspect such vault, who shall act at once, and upon their inspection such action shall be taken as they or any two of them may in writing suggest.

"SEC. 2. *Be it further ordained*, That after the privy vaults have been cleaned out, disinfected, and filled up, the fecal matter from receptacles provided therefor shall be removed at the expense of the district until connections can be made with the sewers now in contemplation of construction, or until such time as this council shall further determine; and receptacles shall be furnished by the district to all who choose to accept the same, at the lowest cost price.

"The object of this modification being to more effectually and certainly prevent the pollution of soil, air. or water, and carry out the recommendations of the National Board of Health.

"Passed January 10, 1880.

"D. T. PORTER,
"*President.*

"C. L. PULLEN,
"*Secretary.*"

The plan of sewerage proposed by Colonel Waring was finally adopted by the legislative council, and in the latter part of January contracts were made for sewer-pipe, and Colonel Waring was appointed to superintend the work, which at the present time is going on as fast as the nature of the case will admit. It is hoped that the principal portions of the city will have sewer connections by the 1st of May next. The work of condemning and destroying unsanitary houses, shanties, &c., has been going on in accordance with the necessary legal forms, and over one hundred such houses have been destroyed at the present time.

In addition to those that are to be destroyed there are a large number of houses in Memphis which ought to be raised from the ground, so as to permit the circulation of air beneath them.

The quantity of dangerously infected material, bedding, clothing, &c., now in the city of Memphis which has not been disinfected is probably small. In a majority of houses in which the disease occurred during the past year articles of infected clothing or bedding were either destroyed or disinfected at the time, and the location of the remainder has been pointed out in detail to the health authorities. The committee have also strongly urged on the authorities from time to time the destruction of collections of rags, of which there are several in junk-shops in Memphis. One of the largest of these collections was burned by an accidental fire in the fall of the year. While it is quite possible that during the cold weather these rags might be baled and sent to paper-mills in the North and be there used with impunity, it is well known that the stock received at paper-mills is often not used for a number of months, and that thus there is certainly at least a possibility of conveying the disease in this way. Irrespective of this, however, it is believed that the general principle of forbidding the exportation of rags of any kind, from a place so dangerously infected as Memphis has been, is one that should be maintained, and that to secure the confidence of neighboring communities all such collections should be forbidden, and if found should be promptly destroyed. It is impossible to secure satisfactory evidence that the whole of any given quantity of rags has been properly disinfected, and the value of such collections is not sufficient to warrant attempts at their preservation.

Owing to the delays in obtaining the necessary authority from the legislature deciding upon the plan for sewerage, making the necessary contracts, &c., it will be impossible to commence the work of laying the sewers at the point where it is desirable that this should be done, viz, at the lowest point on the level opening into the river, since the river is now many feet above low-water mark, and extensive backwater is caused in the Bayou Gayoso. To avoid the difficulty which this would cause it is proposed temporarily to turn the sewage into a large iron pipe at present used for carrying the sewage from the prison into the river.

It is hoped that much will be done before the approach of warm weather in the way of destruction of infected material and houses, of cleaning and filling the worst of the privy vaults, in establishing a system of sewerage, and to some extent a system of drainage throughout the city. Very little, however, can be done during the present season to remedy the evils of the present water supply. The difficulty and cost of extending by means of inverted siphons the supply pipe for the present water-works across the Wolf and Hatchie Rivers to the Mississippi River is so great that the parties now having control of the water-works will not attempt it. The majority of the cisterns in the town contain water which is unfit for use, at least without boiling; and the water from the Wolf River is unfit for use without careful filtration, by means of filters which should be very frequently renewed.

The report of Dr. Reilly, and especially the statistics of the mortality of the city, with his remarks thereon, furnish additional proof, if any were needed, as to the unsanitary conditions which have prevailed.

The following communication was addressed to President D. T. Porter, under date of February 16, 1880:

"DEAR SIR: I have the honor to invite your attention to the fact that it will be prudent for the municipal authorities of Memphis to keep in view the possibility of the reappearance of yellow fever in that city as warm weather comes on, somewhat as the disease appeared last year. While we have good reason to hope that the sanitary measures which have been inaugurated, and are now being urged, by the city may have the effect to free the place of local causes of this disease, it is still impossible at the present time to say with certainty that this will be completely effected. This uncertainty increases the responsibility of those officially charged with the interests of the city, and makes it imperative that the powers conferred and the duties imposed upon them by law be utilized and discharged to the fullest extent.

"In view of the great desirability of taking every precaution to prevent the recurrence of an epidemic during the coming year, I would respectfully offer the following suggestions, premising that I do this with a full appreciation of the difficulties and drawbacks under which the officers of the taxing district have heretofore labored, but which it is presumed are now in the main removed by the decision affirming the constitutionality of the district government.

"Sections 158 and 259 of article 1, chapter 5, of the ordinances of Shelby County, Tennessee (see pp. 97 and 125-6 of Heiskell's Digest, Memphis, 1879), confer upon the board of health the authority to make, establish, and declare all rules, orders, special regulations, and sanitary ordinances necessary for carrying into effect the provisions and powers contained in said article. And the latter section (259) declares the neglect or violation of any such rules, orders, sanitary regulations or ordinances, to be a misdemeanor, punishable by fine on trial and conviction.

"Under this authority it is clearly the duty of the board of health, as it is certainly of the utmost importance, to 'declare,' by publication in the columns of the daily papers, by circular, and by other usual methods, the duties and responsibilities of the various classes of the community, professional and secular, with reference to the public health. It is idle to expect that any large number, even of physicians or other intelligent members of the community, will make such study of the ordinances as is necessary to define their duties and responsibilities; but it may be safely asserted that if the requirements were understood they would receive prompt and willing compliance from the large majority of all classes. As early notification of the existence of contagious disease is of the first importance at all times, but more especially at present, I would suggest that the regulations of the board for the enforcement of section 236 (see Digest, p. 118), requiring 'every physician to report to the board of health in writing every person having a contagious disease,' &c., set forth that it shall be held to be a substantial compliance with this section if the physician furnish to the householder or head of the family in which a contagious case may be a written certificate containing the information called for in said section. Regulations, based on section 240 (*ibid.*, p. 119), should then make it a substantial compliance with the requirements of this latter section if the householder or head of the family promptly deliver said certificate to the secretary of the board of health, but in default of the attendance of a physician should still enforce a literal compliance with the section.

"In this, as in all other regulations of the board, the penalties as prescribed in section 259 (*ibid.*, pp. 125-6) should apply to failure of either party, and should be clearly specified and strictly enforced. My reason for making this suggestion is that it is for the benefit of the householders of the city of Memphis, and not for the benefit of physicians, that such reports should be made, and I do not think it just or good policy to undertake to compel physicians to make such reports without giving them adequate compensation. As a matter of fact all physicians do not make such reports, and at no place in this country has it been found possible to literally enforce such a law. Another reason is the fact, to which I shall again allude, that among the negroes a physician is by no means always called in in case of yellow fever.

"The enforcement of section 240 in the manner indicated would, however, tend to secure reports even in such cases.

"Like action is suggested with reference to the following sections, if it be true, as I am informed, that these sections are ignored.

"Section 154 (*ibid.*, p. 96), requiring physicians, midwives, and others practicing about the cure of the sick or injured, to be properly registered at the board of health.

"Section 237 (*ibid.*, p. 118), requiring reports of deaths from contagious or infectious diseases within twenty-four hours after their occurrence. (I am informed that under the existing practice a death from a contagious disease might occur on Sunday morning and the board of health would have no official cognizance thereof until the following Saturday evening.)

"Section 251 (*ibid.*, p. 122), forbidding the retention or exposure (as in public funerals of decedents from contagious diseases) of dead bodies, to the peril or prejudice of the life or health of others.

"Sections 252, 253 (*ibid.*, p. 122), requiring reports of births, marriages, and deaths.

"In such regulations and orders as the board may profitably publish at the present time concerning the foregoing, it is very desirable to charge those immediately interested, namely, the householder or head of the family, with the duty of communicating directly with the board, as has been already indicated. Wherever the phrase 'contagious disease' occurs in any quoted section of the ordinances, or in circulars, orders, &c., its definition as given in section 154 (cholera, yellow fever, or scarlet fever) should also be set forth, or so much of it as may be necessary to keep clearly before the public mind the object of the requirements. In addition to the necessary declaration of regulations for the enforcement of the above-named sections, and whose prompt publication I cannot too strongly urge, I think that great benefit would accrue from a circular or card of instructions (which, of course, should have the force of a regulation of the board) to the various classes of persons mentioned in sections 238, 239, 241, 242, 243, and 244. Such circulars or cards should be furnished the proper persons, and required to be preserved and conspicuously displayed in, for example, the cabins of all steamboats, in all railroad baggage, express, and passenger coaches or cars, and at railway stations of roads centering in Memphis; in the offices and all rooms of hotels, inns, boarding and lodging houses, &c. It will be understood that such action as is hereby suggested must be continuous; that orders and regulations will need repeating and explaining, possibly modifying, from time to time, according to circumstances and developments. In sanitary matters the educational process is never-ending; new scholars need the old lessons, but the results are much more creditable and cost vastly less than the most scientific and efficient efforts that can possibly be made in dealing with an epidemic after it has been allowed to begin.

"Aside from these suggestions of methods for the discharge of duties made obligatory by statute, I have also to urge—

"Secondly. That measures be taken to secure, as far as possible, reliable information with regard to the health of the colored population of Memphis so far as the four diseases above mentioned are concerned. This is specially important during the months of June, July, and August of the present year with reference to yellow fever. The negro, as a rule, has no great fear of yellow fever, and often does not think it necessary to call in a physician. If it be possible to obtain information of sickness among the colored population, through some of their church or other organizations, for the present summer I strongly recommend that it should be done.

"Thirdly. I would recommend that the necessary organization be agreed upon beforehand for securing the most complete isolation possible of the first cases of yellow fever. This is of the very greatest importance. Unless these measures are agreed upon beforehand, when the first case occurs it will be too late to attempt to prepare and enforce them in the panic which will ensue. This isolation should relate to the sick person, to his room and its contents, and to the house. For suggestions as to details you are respectfully referred to the instructions given last summer to inspectors of this Board, which instructions will be found on page 4 of Supplement No. 2 of the National Board of Health Bulletin, being the report of the National Board of Health for 1879, a marked copy of which is this day sent to your address. If the fever should appear in Memphis this year from causes remaining over from preceding years, very probably the actual cause of the disease in the first case may not exist in his residence. Isolation, however, should be carefully practiced with regard to the case and to the residence, and a sharp lookout kept for other cases. If other cases occur, careful examination will soon show a certain limited area within which all the infection has occurred. As soon as this can even be approximately determined, this area should be entirely depopulated, and no person should be allowed to enter it thereafter, except such as have had yellow fever, and who are sent into it to carry out a careful, methodical, thorough system of cleansing and disinfection under the direction of a competent officer. By prompt and efficient isolation and disinfection, I believe that the spread of the disease may be prevented and the necessity avoided for the very costly and highly demoralizing process of depopulation of the whole city. Whatever ordinances may be necessary to give the health department full power to enforce this isolation should be enacted, and, under the circumstances, it is the duty of every member of the community to use all his influence to secure it."

Under date of February 23, 1880, Hon. D. T. Porter, chairman of the legislative council, Memphis, forwarded a communication to the board in which it was suggested that in order to make more thoroughly and promptly available before the advent of warm weather the sanitary information acquired by the house-to-house inspection, it would be expedient that the National Board of Health should temporarily detail one of its inspectors familiar with that information to co-operate with and assist the local board of health in the sanitary work now in progress.

He also stated that such inspector would be given necessary authority, as executive officer of the local board of health, to enable him to carry out the suggestions made in the letter of the chairman of the committee on the sanitary survey of Memphis, dated February 16, 1880. This suggestion of Governor Porter was approved by the executive committee, and Dr. S. H. Collins, one of the inspectors of the National Board, employed in the house-to-house survey and formerly secretary of the board of health of Memphis, was detailed in accordance with this request.

The authorities of the taxing district and the leading citizens of Memphis have afforded the committee and its agents every means in their power to facilitate the work. The committee is also especially indebted to Hon. John Johnson and to Maj. W. H. H. Benyaurd, U. S. A., for advice and information.

It is believed that the results of the sanitary survey will be very valuable, not only for immediate use but for future reference, to the authorities and citizens of Memphis.

A commencement of a sanitary history of every house in the city has now been obtained, and a very moderate expenditure will keep this record complete for the future.

There are many other cities in this country which would be greatly improved and profited by such a house-to-house inspection as has been made in Memphis, and it is to be hoped that the citizens and municipal authorities of all our towns and cities will see that it is much wiser to make such an inspection before the epidemic than after it.

Respectfully submitted.
For the Committee:

J. S. BILLINGS, M. D.,
Chairman.

Documents accompanying the report of the chairman of the committee on house-to-house inspection at Memphis.

A.

REPORT OF DR. F. W. REILLY.

SIR: In pursuance of instructions from the committee on the sanitary survey of Memphis, received November 21, 1879, charge of the house-to-house inspection of the city was assumed on the following day, November 22. Sufficient preliminary work had already been done to demonstrate the necessity for a material modification of the plan originally proposed, and which contemplated that the inspections should be made by four or five medical gentlemen detailed for that purpose. At the rate of progress prior to November 21 it was evident that the work could not be accomplished in season to be of any practical utility before the advent of warm weather. Therefore, under the authority conveyed in the instructions above mentioned, and which were, in brief, to push the work to completion as rapidly as was consistent with thoroughness and accuracy, and to this end to engage such number of sub-inspectors as could be profitably employed, a force of twenty-six men (subsequently increased) was put into the field on the following Monday, November 24. These were paid at the rate of two dollars per day of actual services, and worked in ward squads, each ward under the immediate charge of a sanitary inspector detailed by the National Board of Health for that purpose. These men were furnished with fifty-foot measuring tapes, two-foot rules, lanterns and indelible pencils, and printed forms and returns. In addition to the direct supervision of the inspector the daily returns of each squad were required to be revised and indorsed by that officer before forwarding to this office, thus making each inspector personally responsible for the correctness of the work of his subordinates.

Some difficulty was at first encountered in securing competent men for sub-inspectors and in teaching these the distinction between facts and opinions, and much time was consumed in correcting faulty returns during the first week or two; but a steady improvement was manifested, both in quality and quantity, as the work progressed.

In addition to the supervision of their respective squads each inspector was required to personally examine and report upon the special sanitary features of the ward under his charge, and to call attention at once to the graver nuisances and conditions needing immediate action.

Field work was completed on January 3, 1880, having occupied thirty-four working days, on fourteen of which rain fell in sufficient quantity to seriously interfere with inspections. (During the period the total rain-fall amounted to 14.52 inches.)

The office work embraced, in addition to the tabulation of the inspection returns and the strictly clerical routine duties, the preparation of various special reports (on the public schools, the river front, condition of the bayous, condemnation of buildings, infected material, garbage removal, &c.), which were submitted from time to time to the local authorities through the resident member of the committee, Dr. R. W. Mitchell, National Board of Health.

A schedule of the conditions requiring attention from the local authorities was also compiled for each ward as soon as its inspection was completed, and this was transmitted, through the same channel, to the authorities of the taxing district. Ten of these schedules were thus prepared, covering 256 pages of legal cap paper in six columns, and setting forth the location and description of 12,390 insanitary conditions of all grades.

Ninety-six folio volumes of inspection returns, covering 9,508 inspections, have been paginated, indexed, and grouped by wards in such a manner as to make instant reference to the original inspection of any locality possible. The tabulation of the returns fills four royal folio volumes, containing 176,433 different entries. On these sheets it is believed every structure and individual lot of ground within the corporate limits of Memphis is succinctly described, with its sanitary history at the date of inspection.

Data have also been furnished from this office to Major Benyaurd, United States Engineer Corps, from which has been compiled a map showing the ownership, area, and estimated value of the property abutting upon the bayou. (This is intended to further the plan for the bayou conservancy, recommended by the committee on the sanitary survey.)

A sanitary ward map, indicating, by colors, condemned buildings, infected material, yellow fever localities of 1878–'79, foul vaults, polluted and suspicious water supply, and public nuisances, has also been prepared, and such a map of the entire city is now being completed. These subjects are so designated that ready reference may be made to the original inspection return for a full description of any individual locality.

During the progress of the work the following gentlemen have been engaged as inspectors by authority of the National Board of Health:

Dr. G. D. Bradford (Memphis), from November 7 to December 31.
Dr. S. H. Collins (Memphis), from November 7; still on duty.
Dr. H. Ess (Memphis), from November 7 to November 24.
Dr. P. B. McCutchon (New Orleans), from November 28 to December 31.
Dr. G. W. Overall (Memphis), from November 24 to December 15.
Dr. F. W. Parham (New Orleans), from November 28 to December 31.
Dr. W. B. Winn (Memphis), from November 7 to December 31.

Accompanying this letter is a general outline of the sanitary history of the city, based in great part upon the results of the house-to-house inspection, and covering, it is believed, most of the topics of general interest.

I am, sir, very respectfully, your obedient servant,

F. W. REILLY, M. D.,
Inspector-in-charge.

JOHN S. BILLINGS, M. D., U. S. A.,
Chairman Committee on Sanitary Survey of Memphis.

Summary sanitary history of Memphis, Tenn., based upon a house-to-house inspection of the city, November 24, 1879, to January 3, 1880, made under the direction of the National Board of Health.

The city of Memphis, at present the "taxing district of Shelby County," is situated in Shelby County, Tennessee, latitude 35° 7′ north, longitude 90° 7′ west, with a greatest altitude of 287.44 feet above tide-water in the Gulf of Mexico.

As early as 1682 the site of the present city was occupied as a trading post, by the French under La Salle, who made a treaty with the Indians of the Chickasaw tribe, and built a fort upon the bluff, which bears their name. In 1783 the region was taken possession of by the Spanish governor-general of Louisiana, Don Gayoso, whose name is also perpetuated in the bayou running through the city. Gayoso fortified the post at the then mouth of the Wolf River, about where the foot of Jefferson street now is, and the Spanish occupation continued until the treaty of San Ildefonso, in 1803.

The original purchase of the five thousand acres in which the site is included was made in 1783, by John Rice, a merchant who removed from North Carolina to Nashville about this period. In 1794 Judge John Overton became the owner of the tract and conveyed a half interest in the property to General Andrew Jackson, who in turn sold three-fourths of his interest to James and William Winchester in the year 1819. In the following year, 1820, the town was planned, and called Memphis. At this time the settlement numbered fifty-three souls. In 1826 the town, with a population of between five and six hundred, was incorporated; but, owing to local rivalries, two corporations, the "city of Memphis" and the "city of South Memphis," were erected under the charter, and so continued until 1852, when they united in the election of one mayor and one board of aldermen.

POPULATION AND GROWTH.

At this time the population was estimated at less than 10,000, a rapid advance being claimed for the two subsequent years, so that in 1854 a census showed 12,000 inhabitants, which was increased by the close of 1857 to an estimated population of 25,000, this rapid growth being attributed to the completion of the first portion of the Memphis and Charleston Railroad. Although there was a large increase between 1850 and 1860, this latter estimate was not borne out by the figures of the eighth United States census, which gave Memphis a population in 1860 of 22,621, as against 8,841 in 1850, by the same authority. The ninth census (1870) placed the population at 40,226; but it is important to note, in this connection, that the city limits were materially enlarged in 1867–'68, so much so that they embraced 4,114 acres at the time when the ninth census was taken; and much of this additional area was as thickly settled as the average of the former or present area. During the session of the State legislature of 1871 and 1872 another change was made, and the area was reduced to the present city limits, a reduction which cut off 37+ per cent. of territory and 39+ per cent. of population. This would make the population of 1870, contained within the area of the present city limits, 24,253, and it is this figure, and not 40,226, which should be taken in any estimate of the growth of the city within the past decade.

PRESENT POPULATION.

On the 1st of January, 1880, the population of Memphis, as shown by the house-to-house inspection returns, is 30,659, showing an increase of nearly 26.4 per cent. since 1870. Of these there are 16,705 whites in 3,775 families, an average of 4.42 persons to each family, and 13,954 colored in 3,609 families, an average of 3.87 persons to each family—a mean average of 4.15 persons to the aggregate of 7,384 families. These occupy 5,584 of the 6,386 dwellings accounted for, giving an average of 5.49 persons to each occupied dwelling. In 1870 there were 5.14 persons to each family (white and colored not separated), and 6.28 persons to each dwelling. The reduced average of occupants to dwellings is readily enough accounted for by the large number of buildings erected during the decade—an increase equal to nearly 54 per cent., while the increase of population is, as above shown, less than 27 per cent. An explanation of the reduction in the number of persons to a family is more difficult, and is complicated with questions involving a study of the epidemics of 1873, 1878, and 1879, of the changed social status of the colored people, and other factors, not, probably, beyond the scope of a "sanitary survey," but for which no opportunity has yet offered.[1]

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[1] This percentage of reduction of population is reached by the following process:

Within the city limits of 1870 there were 6,408 dwellings, with an average of nearly 6.28 persons (6.2774+) to each. There are in the present city limits 6,386 dwellings, of which number 2,524 are returned as ten years and under. Deducting these latter from the total present number leaves 3,862 dwellings, which in 1870 were within the present city limits, and as a consequence 2,546 in the area since cut off. Multiplying these 3,862 by 6.28, the average number of persons in each dwelling at that time, gives 24,253 as the figure of population with which to compare the present population. The

AREA AND TOPOGRAPHY.

An area of 2,590 acres is embraced within the present city limits, the outlines of which approximate the figure of a truncated right-angled triangle (or trapezoid), the truncated extremity (8,175 feet) being the northern boundary; the perpendicular (13,650 feet) the east boundary; the base (11,625 feet) the southern boundary; while the hypothenuse (17,000 feet) is the water frontage on the Mississippi River.[2]

The site of Memphis and the country immediately surrounding it is the Fourth Chickasaw Bluff, a Loess formation, consisting of a fine siliceous loam, of a rich chrome yellow or buff color. This is super-imposed upon a varicolored stratum of sands and gravel, locally known as the "orange sand," a southern extension of the drift formation, and immediately beneath which is found the La Grange group of clays and sands of the Tertiary period. The "orange sand" stratum is nearly horizontal, so that it is reached at varying depths according to the thickness of the loam above it.

The bluff formation is well defined along the southern half or two-thirds of the river front of the city where it presents a bold, almost perpendicular western face, cut through by street openings to the levee. Its greatest elevation is in the southwestern section (on Tennessee street, near the corner of Talbot), where it rises to a height of 67.9 feet above the highest water mark, that of 1867. From this point, along the river front, it gradually descends toward the north, until it is lost in the valley of Bayou Gayoso, some 1,500 feet south of the north boundary. Toward the south the inclination is much less, so that at the south boundary near the river, the highest bluff level is still 57 feet above high water. North of Bayou Gayoso the bluff again rises, but recedes from the river at a much greater angle. Extending back (east) from the river the surface is undulating, with the long axes of the swells and depressions in general north and south lines, except in the northern portion ("Chelsea," "Scotland," and the upper part of "The Pinch"), where the long axes run nearly east and west.

NATURAL DRAINAGE SYSTEM.

Through the depressions flow a series of bayous which form the natural drains of the area, only a narrow strip along the river front draining into the Mississippi River, except in the extreme northwestern portion of the city. Of these bayous, the Gayoso and Quimby are the most important. Bayou Gayoso (with its east and west forks, and its tributaries, the Little Betty and De Soto) drains the southern and central divisions of the city, and flows in a general northerly direction until it receives Bayou Quimby with the drainage of the northern division, when it pursues a northwest and west course, emptying into the Wolf River at a point about 2,500 feet above the junction of the latter stream with the Mississippi.

This natural drainage, flowing mainly from south to north, is still further supple-

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exact figures would be 3,862 × 6.2774 = 23,243.31 population in 1870 within area of present city limits; and 2,546 × 6.2774 = 15,982.26 population in area cut off in 1871-'72.

If it be sought to compare the population of 1870 (40,226) with that of 1880, it will be necessary to assume the same ratio of increase for the area cut off in 1871-'72 as is known to have been made within the present city limits. This is 26.4 per cent., and would give a total present population of 50,485 within the same area as that occupied, according to the ninth census, by 40,226 persons in 1870.

[2] In order to arrive at the percentage of error in these figures—both that of the "personal equation" and that due to the movement of population—an experimental census of 5 per cent. of dwellings was taken on January 14, 1880. This was done by assigning to each of four men a certain number of dwellings in each ward, the number being distributed pro rata to the total number in each ward. The houses were not designated in advance, but their selection was left to the discretion of the men, care only being taken that the houses should represent all portions of the ward. When these returns were brought in they were entered upon sheets, the first column of which contained the location by street and number of each house visited; the next two columns gave the numbers of white and colored occupants, respectively, found in each house on the 14th of January. The totals of these latter columns were then footed up, and, lastly, the original inspection returns of these same houses were consulted, and in the two remaining columns the numbers of white and colored occupants during November and December were entered. On footing up these columns there was found a difference of only *two* between the total occupants of the same houses on January 14 and in November and December. That is to say, in [illegible] occupied dwellings taken at random on January 14, there were found 1,533 persons; on comparison, these dwellings were found to have had returned, by a different set of inspectors during the previous November and December, a total of 1,535 persons.

This striking coincidence need not, however, be accepted as conclusive of the accuracy of the grand total, since an analysis of the returns by wards shows a much greater movement than is here indicated. Thus in the fourth ward, which is the hotel and business center, there was a gain of 36 whites and 2 colored, while in the first and sixth wards—frequented by rivermen—there was a loss of 30 colored, the total movement showing a gain of 38 white persons and a loss of 40 colored. This was exactly the reverse of the anticipated result. It was believed that a considerable number of colored people properly belonging to Memphis were absent in the cotton-fields in November and December; that these would return about the holiday season, and thus increase the proportion of colored in the experimental census. On the other hand it had been asserted that many white refugees who returned in November and December had wound up their business and affairs in the city and removed permanently to other places; a decrease in the proportion of the white population was therefore looked for in January. Under the circumstances, the adoption of any given percentage of error in the house-to-house census must be purely a matter of individual opinion, since none is revealed by the experimental census.

mented by minor undulations running at nearly right angles with the above. As the original conformation of the site has not been materially changed, these undulations afford lateral drainage communicating with the main system, and, with the exception of the localities to be hereafter specified, this surface drainage is ample, even for the heaviest rain-falls.

The average width of the bayous within the city limits varies from ten to twenty-five feet, measured at about mid-height of the banks, and the volume of water varies with the rain-fall and stage of water in the Mississippi.

There are but few springs emptying into the bayous, so that their contained water is mainly made up of the surface drainage, and of what is locally known as "sipe" water—water which has penetrated below the surface, and gradually oozed out through the banks of the bayous. During high water in the Mississippi, the river water enters the bayous and "backs up" the contents of the latter, this "backing up" having been known to extend for over a mile through the most densely settled parts of the city, and leaving behind it, in the bed of the lower part of the bayou, accumulations of mud or silt of five or six feet in depth. As the stage of water in the river is high enough to obstruct the bayou for four or five months in the year, the current is sufficiently retarded during that period to allow of a large deposit of organic matter upon the banks of the bayous, which rapidly decomposes and becomes offensive as the water falls and exposes it to the action of sun and air. In addition to this source of pollution, there are a large number of privies, built directly over the bayous or upon their banks, the contents of which are discharged directly into the waters, while the surface and sipe water, for a distance of several hundred feet in many localities, is also contaminated with fecal filth from surface privies, overflowing and leaky vaults, &c. A five-foot sewer, which gathers the surface drainage of an area of some 140 acres, on which is the city hospital, and several small private sewers also contribute their quota to the fouling of Bayou Gayoso.

Including the city, an area of upward of 5,000 acres is drained by the bayou system: the total length of Bayou Gayoso, from Wolf River to its head, being five and a half miles, with an inclination of 1 foot in 180 in the city limits; the total length of Bayou Quimby, from its junction with Bayou Gayoso to its head, is a little less than four and a half miles, with an inclination of about 1 foot in 140; and the total length of Bayou De Soto, from its junction with Bayou Gayoso to its head, is two and four-fifths miles, with a slightly greater inclination than that of Bayou Quimby.

RIVERS—THE WOLF AND MISSISSIPPI.

Wolf River enters the city in the extreme northwestern section, constituting practically, its northwestern boundary for an extent of about 4,000 feet.[3] It is an exceedingly tortuous stream, flowing through cypress swamps and cane-brakes for about 65 miles, and receives the Loosa Hatchie River just at the northern boundary of the city. Like the bayous, it is "backed up" when the Mississippi rises more than 15 feet above low-water mark, and it is asserted that at such times the foul waters of the bayou also enter and pollute it. A tannery and a group of slaughter-houses, located about 300 yards below the water-works, discharge blood, offal, and refuse into the stream through a small "run," upon whose banks they are built. It is also stated that when this "backing up" occurs such material is necessarily carried up to the pumps. Aside from its malarial influence, derived from the "bottom" lands, through which it flows, the chief sanitary importance of the Wolf consists in its being, to a large extent, the source of the water supply of the city, as above intimated. Its waters have been analyzed by Assistant Surgeon Smart, United States Army, and detailed information concerning it will be found in his report upon the water supply of Memphis.

It should be added, however, that personal observation does not confirm the statements made as to the pollution of the water supply by the "backing up" of the bayou and river. With a stage of about 21 feet of water in the Mississippi, and while the bayou was still "backed up," a decided outer current was found in the Wolf opposite the water-works. It is obvious that any rise in the Mississippi sufficient to dam up the waters of Wolf River would also dam up the contents of the bayous and of the "run" above alluded to; and that as the water falls the outward current in the Wolf will be re-established, carrying out with it the retained contents of the bayous and "run." The contents of these latter can only be carried up Wolf River to the water-works when to a suitable stage of water in the Mississippi shall be added a local rain (confined to the watershed of the bayous) heavy enough to swell the volume of water discharged by the bayou beyond the volume of water contained in the Wolf, and sufficiently greater to overcome the fall in the latter stream from the water-works to the mouth of the bayou. Remote as such a coincidence would seem to be, it is stated to have occurred twice within the past ten years. There is, however, reason for believing, from personal observation, that the surface water of the Wolf may be carried up stream for a considerable distance, even when the deeper water is flowing out. Whether this ever occurs to such an extent as to carry the foul waters of the bayou and "run" up to the pumps it is not presumed to assert.

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[3] In the northwestern portion of the city a section of low alluvial land, about 300 acres in extent, is separated from the first and ninth wards by the Wolf River. This is subject to overflow during high water, is partly cultivated in cotton, has one white and twelve or fourteen colored families (who are obliged to vacate during high water), and possesses no features of sanitary interest apart from those which characterize the Mississippi "bottom" generally.

The extreme range between high and low water in the Mississippi at Memphis is about 25 feet, and a gradually shelving shore of varying extent is thus alternately covered and exposed. At the date of inspection, December 16, 1879, with a stage of 19 feet 10 inches above low-water mark, this shore had a greatest width of 258 feet from the foot of the bluff at Jefferson street. Extending north from Jefferson street to the mouth of Wolf River (2,687 feet measured from center of Jefferson to center of Jackson street, along the line of Front Row) the water covered this sloping shore to the foot of the bluff, with the exceptions noted in the reports of a special inspection of the river front (*q. v.*). Extending south from Jefferson street the bluff has been cut away so as to increase the depth of the shore; and this space, known as "the levee," had a varying exposure of from 150 to 260 feet between the water's edge and the foot of the bluff until the line of Beale street was reached (nearly the same distance as that described above). At Beale street the water again came up to the foot of the bluff, but from this point south to the city limits there was an irregular width of from 20 to 200 feet.

THE WATER FRONT.

These three divisions of the river front present strongly marked contrasts. The northern one, beginning at Wolf River, has a low flat area of about four acres ("Happy Hollow") partially submerged during high water, and receiving a considerable portion of the filthy surface drainage of the northern end of the "Pinch," one of the most objectionable quarters of the city, as well as the polluted discharge from the bayous. The bank is sandy and easily washed, so that mattress protection is necessary. From Market street south to Jefferson the bluffs gradually rise, varying in height from 4 to 25 feet, and along this extent are gullies, "wash-outs," deposits of fecal filth, the outlets of box-drains and culverts, and the accumulations of a public "dump," including everything offensive, from street sweepings to the contents of privy vaults, which, up to May, 1879, were carted to the crest of the bluff at the foot of Washington street, and thence allowed to find their own way to the river. The central division consists of the "levee," so called, an improved area paved with stone, clean and in good condition, with the exception of such nuisances as arise from the want of public latrines for the use of the roustabouts, stevedores, rivermen, &c. As the river falls after high water a deposit of mud covers the "levee," but this is washed from the well-paved and steep slope by the first rain. The southern division reproduces many of the evils of the northern one, aggravated by the location of the present public "dump-boat" at the foot of Beale street, a decided nuisance at this date.

The details of the conditions above generalized are embraced in the special report previously alluded to, the substance of which was conveyed to the proper authorities through the committee on the sanitary survey on the 18th of December, 1879, supplementing previous reports on some of the conditions which had been already submitted on November 10 and December 13.

SEWERAGE.

There is practically no sewer system in Memphis, the four and a half miles of existing private sewers having only 215 connections in all. And while the natural facilities for surface drainage are ample they have not only not been fully utilized or preserved, but in many instances they have been materially impaired, and in some entirely destroyed, by changes in the original conformation or by the character of the street conservancy. With an extremely retentive soil this obstruction of natural drainage renders unpaved streets and alleys almost impassable during wet weather, and readily accounts for the large proportion of damp or wet cellars and basements. These causes—namely, the absence of sewers and of subsoil drains and the obstructed surface drainage—also affect unfavorably the areas of "made land," although these are not numerous or extensive. (Such areas are described in the summary description of the wards.)

STREETS AND ALLEYS.

There are 67 miles of streets and 35 miles of alleys within the city limits. West of the bayou these run nearly with the cardinal points of the compass, the variation being a little east of north and south of east. In the northeastern section this variation is more decided, but in the central and southern sections the same general lines are preserved on both sides the bayou. Details as to width, paving, and condition of streets, alleys, and sidewalks will be found in the ward summaries.

STREET CLEANING AND GARBAGE REMOVAL.

An ordinance requires tenants to clean the gutters and sweep streets and alleys bounding their premises for a space of four feet from curbstone, and to pile up the cleansings in the center of street or alley for the garbage carts—this to be done twice a week, the days for each ward or street to be designated by the board of health. The city engineer is empowered to have such work done for delinquents and non-residents at their proper cost; and street railroads and other railroads are required to clean the roadway between, and for two feet on each side, their tracks. Street crossings and intersections are supposed to be kept clean, and street-sweepings to be removed, by the city.

At the date of this report the equipment for garbage removal and street cleaning consists of 2 open wagons, 44 cubic feet capacity; 4 open "Roosa" carts, 32 cubic feet capacity—these for the removal of ashes, street-sweepings, &c.; 2 Louisville air-tight wagons, 52 cubic feet capacity; 1 "Roosa" air-tight cart, 32 cubic feet capacity—these for the removal of wet garbage, &c.; and 16 men and 13 mules.

Theoretically these are supposed to remove six loads each per day—equal to 1,344 cubic feet of dry, and 816 cubic feet of wet garbage—an average distance, including trips both ways, of one and one-half miles to the "dump" at foot of Beale street; and, also in theory, this is supposed to cover 67 miles of streets and 35 miles of alleys, once each week.

Practically, the area west of the bayou, south of Auction street, and north of Calhoun street—about two miles long by half a mile wide, and comprising the larger part of the first, all of the second, third, and fourth wards, and much of the sixth ward—is fairly well covered once a week by this force. Much complaint, however, is made of neglect, even in this limited region, and no pretense is made of going into the unpaved streets and alleys in wet weather—in fact, it would be hardly possible to do so. At long intervals, in response to urgent demands, a cart is sent into "Chelsea" (ninth ward), but the fifth, seventh, eighth, and tenth wards—*i. e.*, the region east of the bayou—are substantially ignored, and garbage is here disposed of in every conceivable way—thrown on vacant lots, in alleys in rear of premises, in yards, in disused cisterns and wells, in abandoned privy vaults and gullies, and on the banks of the bayous.

Instead of an average of 54 loads per day being gathered and disposed of (as is believed and stated by the health officer), inquiry at the "dump" and an examination of the dump-keeper's book for a recent period of ten days show an average of 29.2 loads per day, a little more than half the theoretical capacity of the force and equipment. The health officer thinks he should have his force increased at least one-third to thoroughly and promptly remove the garbage from the area west of the bayou, and is unwilling to make an estimate of the force necessary to cover the rest of the city.

No marked or radical improvement is to be looked for in this direction until roadways practicable at all seasons are provided; but much relief might be secured (1) by taking advantage of favorable weather, during which the force should be temporarily increased to the necessary capacity, and (2) by vigorously enforcing the ordinance above referred to, such enforcement to be pushed *pari passu* with the capacity for prompt removal.

BUILDINGS—MATERIAL, AGE, AND CHARACTER.

Of the 7,202 buildings of all kinds (this is exclusive of out-houses) within the city limits, 72 per cent. are of wood, 27 per cent. of brick, and the remainder of stone (13) and iron (1). In the strictly residence portions of the city—in fact, in all but the third and fourth wards—the large majority of the buildings are of one story, there being (with the exceptions above noted) 4,188 dwellings of one story as against 2,198 of two or more stories. Many of the structures returned as "occupied dwellings" are, in effect, the cabins of one or two rooms which, prior to 1861-'62, constituted the slave-servants' quarters. Of these (one or two-roomed dwellings) there are 1,209 returned, and this item is of consequence in connection with the remarks which follow concerning the condemnation of buildings.

About 10 per cent. of the total number of all buildings have been erected within the past five years, and nearly one-fourth of the total number were erected between 1870 and 1875. These buildings, 2,524 in number, embrace the large majority of the really healthy habitations and substantial, well-ventilated, and properly-lighted business blocks. A large number of buildings erected between 1865 and 1870 are mere shells, with thin, insecure walls, flimsy and badly-fitting wood work, and inadequate ventilation and lighting. There are few exceptions to the indictment of this class. Of the remainder (about 40 per cent. of the total number), the ages range from fifteen to fifty years, and there are few of these which do not require radical alterations in order to justify their retention for occupancy.

One of the most important defects noticeable in dwellings is the want of subventilation, 1,453 dwellings being built so close to the ground as to have no air-space beneath the floor; 2,030 others have insufficient or obstructed subventilation; and only 2,204 (about two-fifths of the total number) comply with the proper requirements in this respect.

CELLARS AND BASEMENTS.

There are 1,515 buildings with cellars and basements, and of these over one-half (786) are badly ventilated, damp, or wet, many with water standing from 2 to 18 inches deep on the floors, and with walls soaked by sipage from the surrounding polluted soil. As very few of these cellars are more than 9 feet deep—fully one-half being between 7 and 8 feet and about one-fourth being less than 7 feet deep—any general system of sewerage and subsoil drainage will remedy this latter defect.

In the two principal business wards of the city (the third and fourth) more than one-third of the buildings were found to have privy-vaults in cellars or basements. Many of these buildings are upward of twenty years old, and the cellars contain from one to five vaults each, the accumulations of an average of a quarter of a century being imperfectly covered over with ashes or earth. Not infrequently the rain-water cistern, from which water for all purposes is used, was found surrounded by these vaults, with the walls almost touching each other. A few instances are to be found in every part of the city, but the majority are grouped where they are likely to do the most harm—in the densely-built and oldest regions.

Among the minor subterranean defects found were 426 cellars and basements fouled by accumulations of decomposing organic matter, infected material, &c. (The past tense is here used advisedly, since much of this has been already remedied through the efforts of the board of health, which has caused most of these cellars to be cleansed and whitewashed and the vaults emptied, disinfected, and filled up.)

CONDEMNATION OF BUILDINGS.

In condemning premises as unfit for occupancy, as well as in recommending buildings for destruction, the basis has been, in all cases, purely and simply with reference to their sanitary condition. Neither weather-beaten looks, intrinsic value, wishes of neighbor, nor unverifiable reputation has been given any weight in arriving at a judgment on these points. This explanation is thought to be pertinent in view of the fact that many buildings have recently been condemned for destruction by the local authorities which are not included in that category in the house-to-house inspection. It is not meant to imply by this that the action of the local authorities has been, or is likely to be, too sweeping, or that their action has been based in any instance on insufficient grounds. At best only a proportion, greater or less, of the unhealthy habitations will be vacated or destroyed; but it was believed any recommendations to this effect having the authority of the National Board should be supported by the clearest and most positive proofs, and that all doubtful cases might be safely left with those who from their official positions and local knowledge and influence are best entitled to exercise a discretion which must entail serious responsibility in questions other than those of a strictly sanitary character.

On the basis above set forth a total of 494 buildings and groups of structures have been recommended for destruction or for vacation pending alterations necessary to fit them for occupancy. These include not only many cheap, almost worthless, one-story shanties, with one or two rooms, but some brick business blocks, hotels, and public buildings. As an earnest full of promise for the future of Memphis it may be noted that the property value of the building has proved no obstacle to the acceptance of the verdict of condemnation; indeed, as a rule, the most prompt compliance has been met with from the owners of the most valuable property. More reluctance, if not positive opposition, may be anticipated from the owners of the numerous "shanties" in disreputable localities, and which rent for two or three dollars a month to the most squalid, filthy, and degraded whites and blacks.

There are few "tenement houses" in the strict sense of that term as applied in large cities, and very few cases of overcrowding have been discovered. Of the 5,584 occupied dwellings 4,365 contain one family each, 905 contain two each, and 314 shelter three or more families in each, leaving still, at the date of inspection, 802 unoccupied buildings. Many of these (unoccupied) are included in the list of condemned, but a sufficient number of habitable dwellings would still be left in which to house all those displaced from buildings recommended for vacation or destruction.

SOIL AND WATER POLLUTION.

So much has been written and said, *ad nauseam*, of the privy system of Memphis, that it is proposed to dismiss it here in a very summary manner, and this the more justifiably, since there is a strong probability of its soon being numbered among the things of the past. At the date of inspection there were found nearly 6,000 sub-surface vaults in use. These varied from mere shallow pits, without any lining, to brick vaults of 40 feet and upward in depth. Considerably less than one-third were sufficiently remote from living-rooms, while the remainder were placed at all degrees of proximity, even to being, as already stated, grouped in cellars. Of the total number, 3,607 were in a foul condition. The extent of the soil pollution from this source may be the better inferred when it is understood that the above figures do not include a large (probably equal) number of disused, but unemptied, vaults, the contents of which were only imperfectly covered by a shallow layer of ashes or refuse.

When it is considered that of the 4,744 cisterns and wells which furnish the larger share of the water consumed 3,408 are within contaminating distance of the known locations of these vaults, and that a large proportion of such cisterns and wells are known to be defective, enough will have been said on these points to indicate some of the causes of the high death-rate of Memphis.

MORTALITY IN MEMPHIS.

An analysis of the mortality records of the health office for the past five years furnishes the following table, which is of interest in this connection:

Causes of death.	Years.					Totals.
	1875.	1876.	1877.	1878.	1879.	
Malarial fever	127	99	121	126	68	541
Typhoid and typho-malarial fever	23	37	41	19	18	138
Cerebro-spinal malarial fever	16	14	17	18	1	66
Yellow fever	0	0	0	2,779	497	3,276*
Erysipelas	6	1	6	1	12	26
Dysentery	66	79	63	30	25	263
Diarrhœa	30	67	61	46	36	240
Cholera infantum	52	21	31	19	32	155
Scarlatina	1	40	17	1	0	68
Diphtheria	5	8	13	11	1	38
Croup	13	4	5	6	11	39
Whooping-cough	25	7	1	20	1	54
Small-pox	8	0	0	0	0	8
Measles	0	13	2	35	0	50
Pneumonia	88	87	108	83	136	502
Phthisis	172	159	180	176	143	830
All other diseases of lungs	18	25	28	34	10	115
Diseases of the heart	27	27	28	29	26	137
Diseases of the urinary organs	2	6	11	1	5	25
Tetanus	10	11	13	7	5	46
Puerperal diseases	17	6	17	14	21	75
All other causes	468	308	491	552	520	2,339
Totals	1,174	1,028	1.454	4,007	1,568	9,230

From the foregoing it will be seen that, exclusive of the mortality from yellow fever, the average death-rate of Memphis is 34 per thousand, assuming the average population for the past five years to have been 35,000. On the census of 1879 the total mortality for that year was 51 in the thousand, and exclusive of yellow fever it was 30 in the thousand. The average death-rate from all causes during the three non-epidemic years was 35. Of the total number of deaths during the past five years over 15 per cent. were due to phthisis, pneumonia, and other diseases of the lungs, the excess being fairly attributable to defective subventilation of dwellings and an undrained retentive soil. Excremental and malarial diseases caused nearly 57 per cent. of the total, and this excess may be set down as due, in great measure, to soil and water pollution.

Under a reasonably efficient sanitary *régime*, with a good sewerage system and pure water supply, the average death-rate of the city should be reduced to about 20 in the thousand within the next lustrum. Until the social and moral status of the colored population is materially improved, it will probably be too much to expect that the theoretical standard of 17 in the thousand can be attained.[4]

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[4] Without any especial relevancy to the above, but simply to record the information, the following data concerning the epidemic diseases in Memphis are here appended. These have been obtained from the note-books of physicians and from other sources among the citizens, and are believed to be trustworthy so far as they go:

Yellow fever.—First epidemic in 1828; distributed pretty generally throughout the village, at that time occupying the bluff near the Mississippi, and mainly north of Market street; over 150 cases in a population of about 700; mortality, 56 recorded deaths. Second epidemic in 1855; confined principally to area south of Union street (South Memphis and Fort Pickering), but followed the bayou on both sides, north and west, to Wolf River; estimated number of cases, 1,250 in a population of about 13,000; mortality, 220 (estimated). Third epidemic in 1867; included area of epidemic of 1855, and extended north and east; estimated number of cases, 2,500 in a population of 36,000; mortality, 500 to 550. Fourth epidemic in 1873; spread pretty generally throughout the city, but more severe in northern portion ("The Pinch," "Chelsea," and eighth ward), and extended east beyond city limits; estimated number of cases, 7,000 out of a population reduced by flight to between 15,000 to 20,000; mortality, recorded between September 14 and November 9 (last death), 1,244; estimated total mortality from

It has been no part of the purpose of this summary to seek for, or to point out, causes other than such as are inherent in the conditions described, nor to fix or distribute responsibility for such conditions. Either of these lines would involve the recital of a story of civic trials and misfortunes which it would be hard, if not impossible, to parallel. To go back no further than the history of the past twelve months for an illustration: The State had already, at the close of 1878, seized one-third of the realty of the city for delinquent taxes, leaving the owners of the remaining $12,000,000 to shoulder the burden of the expenses of State, county, and city governments. To relieve itself of this impending total confiscation, the corporation, on the 31st day of January, 1879, surrendered its charter under an act of the State Legislature, which act created in lieu thereof the taxing district of Shelby County, and under which title it was attempted to administer the affairs of a community still stunned by one of the most terrible epidemics of modern history. New offices and officers, new ordinances and regulations, in short, the entire administrative and executive municipal machinery, had to be created *de novo*, and in the face of weighty doubts as to the constitutionalty of a single step that was taken. Did the health authorities attempt the abatement of the most palpable nuisance, straightway the question arose as to the authority and responsibility, and there were not wanting obstructives and demagogues to interpose all manner of difficulties to the abridgment of the inalienable right of the ὁι πολλοι to be as filthy as possible. Struggling and crippled, still some progress was made during the spring and summer. Visiting sanitarians spoke and wrote in terms of warm commendation of the efforts, both public and private, they found being put fourth to ward off another epidemic visitation and to redeem the city from its legacy of maladministration. With the first announced case of yellow fever, on the 9th July, all this was forgotton, and as the season wore on and the unrelieved monotony of the tale of deaths and new cases first palled upon and then irritated the public ear, Memphis became the theme for all manner of diatribes and abuse—was used to point the tritest sanitary morals and adorn the stalest hygienic tales, until it seemed as though the Bluff City had a monopoly of filth, and every other in the land was a very Dutch kitchen in point of cleanliness.

The truth is bad enough, and no attempt has been made to shirk it or to palliate it by its citizens. They are fully alive to the necessities of the situation, and though they have much to learn and more to do, they are proving both apt scholars and earnest workers. Whether enough can or will be done to avert another epidemic this season it would be premature to assert.

Some of the important recommendations of the committee on the sanitary survey have been thus far ignored or their execution postponed, whether prudently or not the future will determine. But that a marked improvement of the public health must result from what is now being done and contemplated is beyond peradventure.[5]

August 10 (first death), upward of 2,000. Fifth epidemic in 1878; no portion of city or suburbs exempt; number of cases, 17,600 out of a remaining population of 19,500; mortality, 5,150 recorded deaths. Sixth epidemic in 1879; area as general as in 1878, except in localities depopulated by flight or removal to camps; total number of recorded cases between July 9 and November 15 (cases occurred in December), 1,532 out of an estimated remaining population of 18,500, of which number 75 per cent. were "protected" in the sense of having previously had the disease; total recorded mortality, 485. The disease was brought to the city in several other years, but was not communicated to the inhabitants. This was notably the case in 1853, when upward of 80 imported cases were treated in hospital and boarding-houses without any spread.

Cholera.—First appearance in the winter of 1832–'33; number of cases and mortality unknown, but it is described as having been severe and general. Second epidemic in 1835; said to have been between 300 and 400 cases, with a mortality of about 15 per cent.; no data of population at this time but probably about 2,400. Third epidemic in 1849; estimated number of cases about 1,200 in a population of less than 8,000; particularly severe among river boatmen and the foreign population in "The Pinch"; mortality said to have been about 33 per cent. Fourth epidemic in 1867, about 600 cases, mostly among negroes; mortality unknown; disease most severe along Causey street and vicinity (line of contact of fifth and sixth wards). Fifth epidemic in 1873; about 1,000 cases, with 276 recorded deaths; entire population is said to have been afflicted with choleraic diarrhœa.

In addition to the foregoing, *small-pox* was epidemic in 1835 and in 1873; *influenza* in 1842; *dysentery* in 1845 (local, confined to "The Pinch," about 400 cases, and between 40 and 50 deaths); *jaundice*, *erysipelas*, and *puerperal fever* in 1853, and *dengue* in 1860. Prior to 1850 diarrhœal diseases were excessively prevalent, attributed to use of well and spring water; claimed to have diminished on substitution of cistern water.

[5] During the progress of the house-to-house inspection much detailed information has been incidentally accumulated, covering to a great extent the field outlined in the schedule of questions suggested by the National Board for the "sanitary survey of the city or town." This information has been embodied in a series of special reports, which include the following subjects:

Gas and lighting.
Markets.
Slaughter-houses.
Public schools.
Hospitals and charities.
Police and prisons.
Fire establishment.
Cemeteries and burials.
Public health laws (including quarantine).

These reports are so concise as to obviate the necessity for making abstracts, but are submitted in detail as a portion of the report, as is also a *résumé* of the house-to house inspection, in which are

The following is a general summary of the house-to-house inspection at Memph
Tenn., 1879–'80:

Total number structures and premises inspected		12,0
structures	10,873	
vacant-lots	1,218	
cemeteries	5	
Total number structures inspected		10,8
dwellings, including 535 with stores or shops attached	6,386	
out-houses	3,617	
stores and office buildings	648	
churches	51	
halls, theaters, hotels and public buildings	39	
manufactories, mills, and works	35	
academies and private schools	22	
livery stables and stock-yards	21	
cotton-presses, gins, oil-mills, &c	17	
public schools	11	
public markets and slaughter-houses	6	
hospitals and charities	5	
railroad depots and grounds	5	
fire-engine houses	3	
jail, station, and poorhouse	3	
gas and water works	2	
United States Government building	1	
Total number buildings, stores, dwellings, schools, &c., excluding public building, &c., as well as out-houses		7,20
of wood	5,223	
brick	1,778	
wood and brick	187	
stone	13	
iron	1	
under 5 years old	793	
between 5 and 10 years old	1,731	
over 10 years old	4,678	
sub-ventilation good	2,204	
bad	2,030	
none	1,453	
with cellars	891	
basements	624	
Total number cellars and basements		1,5
6 feet deep or less	342	
7 to 8 feet deep	768	
9 feet deep and over (deepest 20 feet)	405	
ventilation good	1,235	
bad	280	
dry	1,009	
damp or wet	506	
clean	1,089	
foul	426	
Total number dwellings		6,38
of one story	4,188	
one and one-half stories	145	
two stories	1,741	
three stories	253	
four or more stories	59	

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embraced the chief points of sanitary interest, arranged by wards for convenience of reference. Thi is believed to be comprehensive and accurate enough to enable the sanitary authorities to outline much if not all, of the preliminary work which it will be possible to accomplish during the present season It is founded upon the details of 9,508 inspections; which details have, in turn, been tabulated on 20 large folio sheets, each of which contains, in single lines, the sanitary history of 50 premises—in th *aggregate a total of* upward of 176,000 items. In this tabulation the street numbers are arranged con *tinuously*, *and by this means* every structure and lot within the city limits is believed to be accounted for

Total number dwellings of one story		4,188
with one room	194	
two rooms	1,015	
three or more rooms	2,979	
Total number yards and areas of stores and dwellings		7,211
drainage good	5,992	
bad	1,116	
fair	103	
surface condition clean	5,802	
foul	1,409	
Total number privies		5,914
under house	451	
adjoining house	165	
within 10 feet of house	367	
between 10 and 50 feet from house	2,226	
over 50 feet from house	1,705	
clean	2,246	
foul	3,607	
overflowing	61	
Total number water-closets		398
clean	273	
foul	125	
Total number urinals		153
trapped	78	
untrapped	75	
Total number earth-closets		6
Total number sinks		374
trapped	78	
untrapped	296	
Total number sewer connections		157
sound	147	
unsound	10	
Total number cess-pools		84
clean	5	
foul	79	
Total number cisterns and wells		4,744
within 10 feet of privy	369	
between 10 and 50 feet of privy	3,039	
over 50 feet from privy	1,336	
Total number hydrants		874
Total number public nuisances		1,184
Total number pools of stagnant water		124
Total number cases of infected material		569
in use	499	
stored	65	
held as merchandise	5	
Total number animals		2,616
Total number geese and other fowls		8,020
Total population		30,659
white	16,705	
colored	13,954	
Total number families		7,384
white	3,775	
colored	3,609	
Total number dwellings occupied		5,584
by one family		
by two families		
by three or more families		(*)

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[*] Statistics of morbility and mortality, as gathered by the house-to-house inspection, were so largely matters of memory and not of record that they are not thought worth presenting in this connection.

B.

REPORT OF DR. CHARLES SMART.

WASHINGTON, D. C., *December* 30, 1879.

SIR: I have the honor to submit the following report of the practical results of my analysis of the water supplies of certain towns and villages in Mississippi and Tennessee.

My instructions did not require an exhaustive chemical analysis of the various waters with the quantitative determination of the saline matters which might be present in them. There was contemplated only what has been called a *sanitary analysis*, an investigation into the question of wholesomeness or unwholesomeness. But as a water which is unfit for potable uses from excess of metallic, earthy, or alkaline salts can usually be detected by its taste or hardness, a sanitary examination becomes practically an investigation into the organic matter which is contained in the sample.

The presence of organic substances can easily be detected in most waters, for there are few which are organically pure; but there is no royal road to an estimation of the quantity, nor to—what is of as much importance—an appreciation of the quality. The examination must consist in instituting a series of experiments on the organic matter, on the substances which accompany it in the water, and on those derived from it. These various witnesses are, as it were, interrogated, and from a consideration of their testimony an opinion is formed as to the quantity of the organic contamination, as to its origin in the animal or vegetable kingdom, as to its source, whether near or remote—in a word, as to the wholesomeness or unwholesomeness of the water which contains it.

The examination being of necessity complex, and each point susceptible of determination by different processes, all of which have their advocates, a consultation was held with Prof. Ira Remsen and Dr. Harmon K. Morse, of the Johns Hopkins University, concerning the ground to be covered by the examination in each instance and the best mode of accomplishing it, consistent with portability of apparatus and other considerations. I am especially indebted to these gentlemen for calling my attention to Tiemann's modification of Schulze's process for the estimation of nitrates, which they have used for some time in their water examinations, and the accuracy of which they have practically determined.

The experimental points decided upon as essential were—

First. The total solids as obtained by the balance after the evaporation of a given quantity of water;

Second. The separation of this total by ignition and the balance into substances dissipated by heat, such as organic matter, nitrates, &c., and the inorganic residue;

Third. An estimation of the amount of oxygen required to oxidize the oxidizable substances present in the water, as affording a view of the organic matter from one side; while a view of the same impurity was to be obtained on another aspect by—

Fourth. The break-up of the organic substances and estimation of their nitrogen in the form of albuminoid ammonia;

Fifth. The quantity of free ammonia present;

Sixth. That of nitrous acid;

Seventh. Of nitric acid;

Eighth. Of chlorine; and,

Lastly. The microscopic appearances of the sediment.

With these data and a knowledge of what might be termed the natural history of the water, whether rain, well, spring, river water, &c., and of its surroundings, it was conceived that an accurate opinion could be given as to its quality, not by the operator only, but by any one conversant with the processes of water analysis, no matter what the method he adopted in the formation of his opinion.

In accordance with instructions, I proceeded to the town of Jackson, Miss., which I found mainly supplied by rain-water collected and stored in underground cisterns. As the time at my disposal did not admit of the examination of a sufficient number of these waters to enable an opinion to be given in general terms upon the character of the supply, I approximated to a generalization by selecting—

First. Water supplying public institutions, such as the State penitentiary, the deaf and dumb asylum, the institute for the blind, &c.

Second. Public or semi-public cisterns.

Third. A few samples from the cisterns of well-to-do citizens.

Fourth. A few from those of the colored people.

Fifth. Samples from houses in which there were, or had recently been, malarial remittent fevers.

Thirteen samples were furnished and analyzed, with the following results:

	Cisterns.	Water good.	Water fair.	Water bad.	Sewage.
Sound	2	....	1	1	....
Sping	3	1	1	1	....
Leaky	8	4	1	3	....
Total	13	5	3	5	....

This is manifestly a bad showing—only two sound cisterns out of thirteen, one containing a water rank with vegetable impurity, while the contents of the other are not above suspicion. That the cisterns are not contaminated with sewage matter is owing to purity of soil, and not to their own merits. Several of them are neither more nor less than shallow wells, receiving more of their contents by percolation than by inflow from above.

One well-water, from northwest Jackson, was received for examination. It was organically impure, even had its use not been contra-indicated by the amount of its earthy constituents.

Having been informed by Dr. Wirt Johnston, secretary of the State board of health, that during the 1878 epidemic of yellow fever the disease passed from Jackson eastward along the line of railroad and ravaged all the settlements along the track to Meridian, except the village of Brandon, I proceeded to that place and secured samples from the sources of supply most generally used. These consisted of three wells—two springs and one cistern. The last was sound, but contained bad water. The springs were good, but one (Youst's) would have been better had the arrangements for preserving it from surface admixture been other than of the most primitive character. Of the wells one furnished good, another fair or usable, and the third an impure water.

The next place at which my instructions called for an investigation was Grenada, Miss. Here the supply was found to be from wells averaging about twenty-five feet in depth. They were all free from any excess of earthy salts.

Eighteen samples were examined, of which fourteen were good waters, one fair and three bad. Of the last, one (Doak's) would probably have shown as a good water had a fair specimen been furnished for analysis. On investigating the well, after examination of the water, it was found that a new pump had been inserted on the day before the sample was collected and that the well was unusually turbid from this interference. The two remaining on the record as bad waters were undoubtedly contaminated with sewage.

The comparative freedom of the wells in this town from sewage infiltration is owing to the absence of privy vaults. The Mississippi State board requires the use of dry earth and surface receptacles, and Grenada has been very thorough in her adoption of this surface system.

For samples of the supply of small country settlements I proceded from Grenada to Duckhill, Miss., where I examined three wells, the waters of which were good, although possessed at times of a sulphur taste on account of a blue-clay stratum which lies below the water-mark.

Returning from this place to Grenada, I collected at Elliott, Miss., samples from three wells, two of which were good and one bad.

At Payne's place, which is finely situated from a sanitary point of view, but which furnished twenty-five cases and thirteen deaths out of one hundred people living there during the 1878 epidemic, I obtained samples from two cisterns and one well. The latter furnished excellent water, but both cisterns, although sound, contained very impure supplies.

At Green's Chapel, the only well yielded a very satisfactory water.

If the above samples from country places can be admitted as illustrations of the well-water supply of such settlements generally, their freedom from organic impurity, from surface washings and sewage, is a matter for congratulation.

Grenada and its vicinity is thus seen to have an excellent water supply, the impurity in the few bad cases being due to local and preventable causes.

At Holly Springs, Miss., where examinations were next required to be instituted, twenty-five waters were analyzed, of which eighteen were from wells, five from underground cisterns, and two from springs.

The following tabulates the results:

	Cisterns, &c.	Water good.	Water fair.	Water bad.	Sewage.
Sound	3	3	....	....	....
Siping	1	1	....	....	....
Leaky	1	....	....	1	....
Wells	18	9	2	3	4
Springs	2	1	....	1	....
Total	25	14	2	5	4

Of the wells contaminated by sewage in this town some are owing to pollution of soil by privy vaults now disused; one arises from the neighborhood of a vault which is yet in use, another from the immediate proximity of a cow-stable, combined with a break in the curb which admits of surface inflow in wet weather. Some of the bad waters can have the organic matter contained in them accounted for only by the presence of large trees, the roots of which may lead surface water into the well with insufficient filtration, or, being in a state of decay, may charge the inflowing water with their detritus. In several of these cases the surface around the well and adjacent tree-trunks is garden ground freely manured with farm-yard refuse.

In passing from Mississippi, where privy vaults have been abolished in favor of the surface system, to Tennessee, where they continue in general use, the character of the well-water supply was found to undergo a marked change. Sewage pollution, which up to this time had been met with only in exceptional cases, was in Brownsville, Tenn., discovered to be the general condition.

Eleven wells were examined, of which only two were good. Two furnished fair or usable water, one was bad from vegetable impurity, and six were found largely contaminated by sewage from vaults. Incidentally, it was noted by Dr. W. W. Taylor, secretary of the local board, that three cases of typhoid had occurred in a house (that of Judge Bond) supplied by one of these polluted wells.

Only two cisterns were examined, one of which was sound and contained a good water, while the other was leaky—a veritable shallow well—and contained a most impure supply.

In a thriving town like Brownsville, where the soil has become so contaminated as to infect the wells in this manner, it is high time for the establishment of a sewerage system. The vaults should be abolished in the mean time and the Mississippi surface system instituted. But this is beyond the limits of my inquiry, and is mentioned only in passing.

So far as the water supply is concerned, it is imperative that some action be taken by the local board. The town is ripe for decimation by typhoid fever and other diseases which originate in impurity of soil and are propagated by impure water. The proper remedy is the organization of a water company and the introduction of a supply from a suitable source entirely beyond the risk of pollution by the consumers. But if this requires an expenditure exceeding the means of the town, recourse must be had in the mean time to a rain-water supply, or, in certain localities outside of the denser areas, to deep wells lined with brick to exclude infiltration from the surface.

The city of Memphis, Tenn., was found to depend for its supply upon three unequal sources, which, in the order of their importance, were—

First. The underground cisterns, of which it was estimated that there were no less than four thousand in use within the city limits.

Second. The wells, of which there were quite a number, but many of them were not used on account of a bad repute, based principally on the hardness of the water or the taste of its inorganic salts.

Third. The hydrant water, or that furnished from the Wolf River by the Memphis Water Company.

Eighty samples of cistern water, from various parts of the city, were examined, with the following result:

	Cisterns.	Water. good.	Water fair.	Water bad.	Sewage.
Sound	36	25	8	3	....
Siping	12	2	1	2	7
Leaky	32	6	2	....	23
Total	80	33	11	5	31

But these cannot be viewed as illustrating the condition of the four thousand cisterns in the city, inasmuch as, although they came from all quarters, they were in every instance selected samples. Many were brought for examination by citizens whose very anxiety concerning their water supply might be looked upon as an argument in favor of the probability of the cistern being sound and the water pure. Other samples, as those from the public schools, were sent in mainly for the purpose of verifying their purity. On the other hand, samples brought by the medical inspectors for analysis were presented on account of their probable impurity, while the last nine of the waters which were examined were selected by the analyst from a list of those known by preliminary examination to be impure.

But while one may not generalize concerning the Memphis cisterns from this table, it shows conclusively that the impurity of the soil is such that when a leak exists in the cistern, the probabilities are strongly in favor of a pollution by sewage of the contained water.

As the complete sanitary analysis of a water occupied so much time, and as the number of cisterns was relatively so immense, a ready method was sought by which the condition of a cistern and the probable quality of its contents might be determined.

At first sight the amount of total solids in a stored rain water would seem to afford the means of judging as to the soundness of its cistern, any sipage or leakage of necessity carrying into the water earthy and other salts which would increase the total. But several instances occurred in the above analyses where lime carbonate in the residue came manifestly from the cement lining of a sound cistern. This method had therefore to be excluded as fallacious.

No objection, however, attached to an estimation of the chlorine present in the water as an index of the condition of the cistern. Rain water contains a small proportion of chlorine, the amount varying with the condition of the atmosphere and the purity of the shedding surface. In the inland city of Memphis the amount naturally existing in its rainfall is not large. Rain which was shed from the roof of the Peabody Hotel during a heavy fall on December 3 contained .075 parts of chlorine in the 100. A cistern water which does not contain more than this must be undeniably free from soil pollution, for the finished analysis showed the soil to be so charged with chlorides that the slightest siping or leakage was marked by an increased chlorine figure. A small excess over the normal might exist and the cistern be sound, the increase being due to an unusual foulness of the roof. As much as .15 parts of chlorine was shown to be consistent with soundness, but as the amount increased beyond this figure the probability of leakage became proportionally great. A series of chlorine determinations was then made on cistern samples collected from all the wards of the city; and, as no selection was exercised, the results may be viewed as expressing the condition of the Memphis cistern supply.

In tabulating them, those waters which contained less than .075 parts of chlorine are set down as from *undoubtedly sound* cisterns, the supply itself being in all probability of good quality. In cases where the amount lay between .075 and .15 parts the cisterns are recorded as *probably sound*, the increase being due to vegetable contamination and foulness of the shedding surfaces, although in a small proportion of the cases it might be owing to a slight siping from the soil. Here the water must be considered of doubtful quality. In those instances where the chlorine figure lay between .15 and .30 parts, the cistern is reported as probably *siping*, the increase coming from the soil, and being in all likelihood a sewage accompaniment, although in rare cases it might arise from a large organic impurity without leakage on the part of the cistern. In either case the water is probably bad. Lastly, where the amount exceeded .30 parts in the 100 of water, the cistern is viewed as undoubtedly *leaky*, and as containing an impure water supply.

CISTERNS EXAMINED.

Undoubtedly sound	127
Probably sound	82
Probably siping	82
Undoubtedly leaky	158
Total	449

In estimating the condition of the Memphis water supply from this source, there should be added to the above figures nine leaky cisterns, making 167 in a total of 458. These nine samples were brought in for the chlorine experiment along with the others, but a complete sanitary analysis having been subsequently made to determine the characters of their impurity, they were removed from the list of cisterns examined to that of cistern waters analyzed.

The large proportion of leaky cisterns, with the strong probability of sewage contamination in each instance, requires that some action be taken to insure a better water supply for the city. But whatever may ultimately be done in this direction, the citizens will have to depend upon their cisterns for some time to come. Yet the character of many of these waters is such as to call, in the interest of the public health, for an immediate interference. In several instances I was enabled, by personal communication with the owners, to warn and advise. But in other cases, where the water was brought by the inspecting officers, I did not have the means of notifying the consumers. To overcome this difficulty and enable action to be taken in the cases of certain cisterns, which from their excessive leakage appeared to require immediate attention, I sent a communication embracing some of the facts here recorded to Dr. R. W. Mitchell, member of the National Board of Health, and of the committee on the sanitary survey of Memphis, with a list of sixty-five of the worst cisterns and a map giving the location and character of the whole number examined.

But the facts developed by the analyses constitute only a small part of the total array which demands investigation in the sanitary interests of the city. Among the thirty-five hundred unexamined cisterns there are at least twelve hundred which leak. These should be singled out by the local authorities by means of the chlorine test, and their abandonment should be ordered if there is manifest danger from soil pollution in their surroundings; but if there is no such danger it would be sufficient to direct them to be cleaned out and relined with a thick coating of Portland cement.

The analyses of the well-waters demonstrated the impurity of the city's soil in as marked a manner as did those of the leaking cisterns. Of nineteen wells, all of which were reported as brick-lined, to exclude infiltration, fourteen contained sewage matter, either in the recent state or oxidized by its passage through the soil. Of the five remaining, the use of one was contra-indicated by an excess of earthy salts, so that there were in reality only four waters, out of this list of nineteen, which could be warranted as fit for use. Of those which showed the presence of organic matter in an oxidized condition, one—Pontotoc—was so free from recent contamination, and at the same time contained such a small proportion of oxidized matter, that the *water* might be considered as wholesome. The *well*, however, must be looked upon as dangerous, inasmuch as an increased flow of water into it might at any time bring unaltered sewage to pollute the supply.

The waters might be thus classified:

Four good in every respect.

One doubtful, as liable at any time to contamination.

Eight bad in every respect.

Four potable so far as recent organic matter is concerned, but condemned on acccount of oxidized organic matters and excess of inorganic salts.

One unwholesome solely on account of dissolved inorganic salts.

One potable so far as inorganic constituents are concerned, but condemned on account of organic pollution.

In connection with the cistern and well water supply of Memphis I have especially to thank Dr. R. W. Mitchell, member of the National Board of Health, and Dr. Frank W. Reilly, superintendent of the house-to-house inspection, for the assistance they furnished in securing the necessary samples for analysis and for many valuable suggestions connected with my work.

Besides the cisterns and wells above enumerated, the examinations at Memphis included one water from a tank or reservoir built above ground, one rain-water collected direct from a roof in order to place on the record the sanitary analysis of the rainfall which was then filling the cisterns, and thirteen samples of river water, one from Elmwood Creek, three from the Mississippi, and nine from the Wolf River.

The supply furnished by the Memphis Water Company is drawn from Wolf River a short distance above its mouth. It is pumped from the river and distributed without any intermediate process of purification.

During the period of my stay in Memphis Wolf River was an uninviting stream, turbid with particles of red clay, which, on account of their extreme minuteness, rendered filtration difficult—from the tendency of the particles to clog the filter—and sedimentation practically impossible. Entangled with the clay there was much vegetable matter, which could be separated only by the separation of the mineral particles. Hence analyses of the water made on samples taken on November 12 and 18 and December 2 and 15 showed it to be unwholesome in a high degree. Many householders who were doubtful as to the condition of their cisterns made use of this water after passing it through a charcoal filter. One such filtered sample was examined and found to be a specimen of very pure water. Those citizens only who made use of the filtered water had an interest in this result, which is to be set to the credit of the charcoal, not to that of the water. Sedimentation was accomplished on the small scale in a few instances by filling cisterns with the river water at a time when the stream was low and comparatively clear. Three samples of water stored in this manner were examined and found to be of good quality. But the long-continued sedimentation in a clean cistern which is to be credited with this result is a process which, like the charcoal filtration, can be accomplished only in individual cases.

It is no doubt true that at other seasons of the year this stream is less impure than at present, but a water, to be suitable for the supply of a large city, should be pure at all seasons, or, if not, it should at least be susceptible of purification on the large scale. The Wolf River water, unfortunately, cannot be thus purified. Any filter which might be constructed would be clogged within a few hours, and a series of reservoirs, to permit of subsidence, would require to be of extravagant size, unless some means were devised to hasten the process.

With the view of ascertaining the character of the water higher up the stream than the location of the water-works, a sample was procured on November 18 from Raleigh, a point nine miles distant from the city. This specimen was found to be somewhat less impure than that collected on the same day near the water company's inflow. But it was unwholesome, from an excess of vegetable matter, and as objectionable as the other when viewed as a possible source of supply. It was loaded with the same red clay which renders the hydrant water so difficult of purification.

In order to effect a comparison between the waters of the Mississippi and Wolf Rivers, Capt. W. H. H. Benyaurd, Corps of Engineers, United States Army, who furnished the samples already mentioned, collected specimens of the Mississippi on November 18 and December 2 and 15. But these were insufficient for the purpose. The periods of flood in the two streams are not coincident. On the first of the above dates Wolf River was somewhat swollen, while the rise in the Mississippi had not commenced. The Mississippi water was then a fair sample of river water, containing a certain amount of vegetable impurity, but by no means so much as has been recorded as existing in some Western streams of good repute as to wholesomeness. On the second date, the Mississippi sample, although very turbid—the river being 7½ feet above low-water mark and rising—was comparatively free from organic matter. On the third occasion the river had risen to 10 feet, and was exceedingly turbid. When the Mississippi is at this height its waters impede the outflow from Wolf River, causing stagnation and flooding in the mouth of the latter. The sample presented the same amount of organic impurity as that furnished by the Wolf River water collected on the same day, enough to condemn it as unfit for potable use.

To establish a comparison between the streams, the annual lines of organic impurity should be determined. But continued observations of this nature do not appear to be called for to decide the question as to which is the better water for a town supply. Both are pure when at low-water mark and free from impurity. Both are impure when swollen and turbid. So far they agree. But the red clay of the smaller stream rises into turbidity more readily and falls more slowly than the more siliceous sedimentary matters of the Mississippi. This would suggest that the annual period of turbidity and consequent impurity is less in the Mississippi. But the possibility of purifying a supply drawn from it should cause it to be preferred, even if its period of turpidity were greater than that of Wolf River. So far as dissolved inorganic substances are concerned, both waters are of good quality.

This report has, of course, no consideration for the engineering and financial sides of the question.

I have the honor to accompany this report with an itemized list of the various well, spring, river, and cistern waters analyzed, and of the Memphis cisterns tested chemically for leakage. I also append a copy of the letter referred to above as having been sent to Dr. R. W. Mitchell, with the view of reaching the local authorities of Memphis.

I have the honor to be, very respectfully, your obedient servant,

CHARLES SMART,
Captain and Assistant Surgeon, U. S. A.

THOMAS J. TURNER, M. D., U. S. N.,
Secretary National Board of Health, Washington, D. C.

MEMPHIS, TENN., *December* 19, 1879.

SIR: I have the honor to report to you that I have concluded my investigation as to the character of the water supply of Memphis; that I have analyzed a sufficient number of the waters collected and stored in the different wards of the city of Memphis to be able to generalize on summing up my results.

Whatever system of water supply may be adopted by the city in the future, the point of immediate interest is the condition of the cisterns. These will have to be used in the mean time, while awaiting further developments. During my examinations I have met with many waters so polluted by sewage infiltration that an immediate interdict on their use appears called for. In many instances I have been enabled to do this by personal communication with the owners; but in other cases, where the water has been brought to me by the inspecting force, I have not had means of notifying the consumers.

In view of the importance of this subject, and of the large amount of facts gathered by analysis during the past few weeks, I have conceived it proper, without trenching on the ground to be covered in my report to the secretary of the National Board of Health, and without awaiting the routine transmission of official communications, to furnish you with some memoranda from my laboratory record, that, subject to your approval, they may be laid before the local authorities and utilized. To the better understanding of the subject a few words are necessary.

On commencing my investigation in this city I made an exhaustive analysis of every water which was presented, determining the total amount of solid matter dissolved in the water, the organic matter, and all those substances which accompany or are formed by the breaking up of the organic matter. When a large number of these were collected it became manifest, on reviewing them, that the amount of chlorine present in a cistern water could be made the test of soundness or leakage of the cistern. On superficial consideration it would seem as if the total amount of dissolved solids would be the best criterion, as rain-water, properly stored, contains such a small proportion of these matters; but many instances occurred showing the presence of lime in comparatively large quantities without that corresponding increase in the chlorine which would be expected if the lime salts siped in from the soil. The inference was that the lining of the cistern was undergoing solution by the water—an important fact, as bearing on the permanence of a cistern in its sound condition, but rendering the total solids, as determined by the balance, of no value as a test of leakage. On the other hand, rain-water contains but the merest trace of chlorine, collected, in its fall, from the sodium chloride which exists in the dust of the atmosphere. It gathers a little more from the roof which sheds it; so that rain-water taken from a cistern gives perceptibly more chlorine to the chemist than that collected in clean dishes. From a sound cistern the water can gather none, so that its presence in excess of the amount normal to roof-caught water is indicative of siping or leakage from the soil. In this city no water which has percolated the soil can be found without chlorine, and hence no leak can exist in a cistern without its presence being detected by a determination of the chlorine present in the contained waters. Having arrived at these conclusions, an examination was made of a large number of cisterns by means of the chlorine determination. Many were found so strongly charged by this contribution from the soil that a larger quantity of water was obtained from the cisterns in question, for fuller investigation, to determine the quality of the matter indicating such an amount of chlorine leakage. The full analysis which I have placed on record gives a value to the simple chlorine determinations, by indicating the probable quality of the water, which corresponds with a given chlorine impurity. But this is a matter for my detailed report.

Accompanying this communication is a map of the city, on which are indicated the sites of 80 cisterns, the water of which has been examined exhaustively, and of 450 cisterns the condition of which has been determined by an estimation of the chlorine. On the map a black circle marks the position of a sound cistern with a presumably good water; a blue circle marks a probably sound cistern; a green circle a cistern which probably sipes a little, or which, in a small proportion of the cases, obtains its excess of chlorine from the accumulations of vegetable matter washed down from the roof; a red circle marks the situation of a leaky cistern, which, if the privy vault adjoins, contains contamination from that source. The circles which are filled in with solid color—black, green, red—indicate sound, siping, and leaky cisterns respectively, and the waters of which have been exhaustively examined. The letters G, F, B, and S express the quality of the examined waters, as good, fair, bad, sewage, as the case may be.

Many of the 530 cisterns leak, but some, of course, to a much smaller extent than others. I accompany this with a list of the more exaggerated cases in which it appears to me that immediate action is demanded. The others, not in this list but marked as "leaky" on the map, require attention, but not so imperatively. These should be filled up, if there is manifest danger of soil pollution from these surroundings; but if there appears no such danger, it would be sufficient to clean them out and reline with Portland cement.

Another point which deserves attention is this: The proportion of leaky cisterns is large—in round numbers one-third of the whole—while again of these the number largely contaminated may be judged of by the list. The number examined (530) is sufficient to indicate the probabilities in the 4,000 (?) or more cisterns which Memphis owns. If it appears imperative, in the sanitary interests of the community, to take action in the cases which have been examined and pronounced polluted, it is no less imperative to find out and remedy the many cases which have not been examined, but which of necessity exist. To this end I would respectfully suggest a continuance of these chlorine determinations by some competent person, in order that the leak may be stopped in those cisterns which it is proper to reline and that the dangerous ones be destroyed. These experiments are simple, do not occupy much time, require no expensive apparatus, and are accurate in their testimony as to the condition of the cisterns.

I have the honor to be, very respectfully, your obedient servant,

CHARLES SMART,
Captain and Assistant Surgeon, U. S. A.

Dr. R. W. MITCHELL,
Member of the National Board of Health,
and of the Committee on Sanitary Survey of Memphis.

APPENDIX K.

REPORT ON THE HYGIENE OF THE MERCANTILE MARINE WITH RECOMMENDATIONS.

BY P. H. BAILHACHE, M. D., *Surgeon U. S. M. H. S.*

REPORT ON THE HYGIENE OF THE MERCANTILE MARINE AND WHAT LEGISLATION OR OTHER MEASURES ARE DESIRABLE OR EXPEDIENT TO PROMOTE THE SANITARY CONDITION OF THE MERCHANT MARINE.

In accordance with the direction of the Surgeon-General of the United States Marine Hospital Service, who was requested by the National Board of Health to detail an officer for that purpose, I have prepared, and have the honor to present herewith, "a report upon the hygiene of the mercantile marine and what legislation or other measures are desirable or expedient to promote the sanitary condition of the merchant marine."

As it was not practicable at the time for me to visit the various ports of the United States to obtain the desired information in preparing my report, I addressed a circular letter to the medical officers of the Marine Hospital Service, stationed at the principal ports of the United States, with a view of obtaining such facts as would lead to a practical demonstration of the necessities of the merchant service for more effective hygiene measures than at present exist.

The circular letter above referred to called for the following information:

First. Condition of the mercantile marine at your port with reference to—
a. Ventilation and general condition of passengers' quarters.
b. Ventilation and general condition of officers' quarters.
c. Ventilation and general condition of seamens' quarters.
d. Condition and location of beds or bunks, in each of foregoing.
e. Character and amount of water supply for drinking and cooking purposes.
f. Character and amount of food furnished, and how prepared, including anti-scorbutics.
g. Is food inspected before going to sea?
h. Tour of duty imposed on officers and men, and pay allowed.
i. Relative to medicine chests, and care of seamen during a voyage.
j. Provisions for safety in time of storm and shipwreck.
Second. Seamen on shore.
a. Character of seamen with reference to their habits, &c.
b. Seamen's boarding-houses, their character, charges, &c.
c. Seamen's boarding-houses with reference to food, ventilation, &c.
d. Boarding-house keepers and shipping agents—do they impose certain restrictions on seamen relative to shipping, &c., requiring them to board at certain houses?
e. Advance wages, and the effect thereof.
f. 'Longshoremen and their relation to the mercantile marine.
g. Number of seamen shipping from your port.
h. Closure of navigation and its effects.
Third. Preventable diseases.
a. Principal diseases of a preventable character observed.
b. Plan for prevention of such diseases.
c. Plan for arresting their spread, if prevention is not practicable.
Fourth. Physical examination of seamen.
a. Plan of such examination as will meet with favor.
b. Relative to a United States seaman's snug harbor for permanently disabled seamen.
Fifth. Apprentices.
a. How to increase the efficiency of the merchant marine.

NOTE.—"The Marine Hospital Service is the medical department of the mercantile marine of the United States. It was established in 1798, and is charged with the duty of preserving the health interests of the officers and seamen employed on American vessels engaged in foreign, coastwise, and inland commerce." (Reg. U. S. M. H. S., 1879.)

The following was also requested:

1. Number of crew to tonnage.
2. Cubic air-space per man.
3. Superficial surface per man.
4. Hospital accommodations on passenger and on emigrant vessels, including space allowed.
5. Bathing appliances on board.
6. Locality of water-closets.
7. Any special arrangements for the accommodation of female and infant passenger.

In response to my letter, reports were received from a number of the officers of the service, expressing great interest on the subject, many of them answering in detail the various questions propounded.

Taking them up in regular order, under the first heading relative to ventilation, and general condition of passengers', officers' and seamen's quarters (*a*, *b*, *c*), there was a general concurrence of opinion, viz: the condition of passengers' and officers' quarters was usually "fair to good," but those of the seamen were reported as "miserably deficient, damp, dark, and unhealthy; only ventilation is through a companionway, or through a small window 8 by 12 inches; quarters close and confined, almost unventilated, generally poorly lighted, as a rule, miserable dens with little cubic air-space per man, and imperfectly ventilated." A few exceptions were made in the case of steamers of well-known popular lines, and of such other vessels as have placed houses on their forward deck.

d. The condition and location of beds and bunks of passengers and officers were usually found to be in accordance with law and tolerably satisfactory; but those of the seamen were variously represented from "indifferent" to "very bad," and from "very bad" to "none at all being provided in good sized vessels." "Seamen are are always expected to furnish their own bedding (dunnage), tin dishes, &c., but frequently go to sea unprovided"; it is reported that on coasters "five out of every ten seamen have no beds." Their bunks, "if they have any, are usually located in the forecastle, a dark, comfortless, and illy ventilated portion of the ship"; sometimes they are placed in the amidships house or forward house, "but in either position are devoid of comfort," though in the latter places are better ventilated. In many instances "the seamen's quarters are very filthy and filled with vermin."

e. The water supply is usually abundant, and in excess of the requirements of law; it is usually believed to be as pure as is generally obtained for domestic purposes on shore, but is never inspected by any authorized person. It is carried in casks or tanks, or both, and these are not inspected. In some of the large trans-Atlantic steamers, condensed water is used for culinary purposes.

f. The character and amount of food is generally satisfactory, and in quantity exceeds the requirements of law; this does not always apply in case of emigrant vessels. Large vessels bound on long voyages are usually provided with lime juice and other anti-scorbutics; they also have a supply of canned meats and vegetables.

g. No inspection is made of the food, either as to quality or quantity, before departure from port, except in rare instances.

h. The tour of duty imposed upon seamen depends greatly upon the size and character of the vessel. On steamers and large sailing vessels the routine duties are divided into day and night watches, four hours on and four hours off, except the "dog watches" of two hours, from 4 to 6 and from 6 to 8 p. m. On coasters there is no fixed rule, as the duties depend on the length of the trip. The pay of seamen ranges from $12 to $30 per month—the former figures for boys, and the latter for good able-bodied men; mates, engineers and stewards receive from $40 to $60 per month, and captains $100 to $150; the latter figures apply to large steamers—the amount paid is sometimes in proportion to the profits of the trip, if so agreed.

i. Medicine chests are carried in most instances, both by steamers and sailing vessels, if over 75 tons burden, in accordance with law, but the medicines contained in them, if they happen to have any, are usually stale, and not suited to the wants of a sick or disabled seaman during a voyage; besides, there is an imperfect knowledge of how to administer them. No regular inspection is made of these chests, as to the quality or condition of the drugs, though required by law, nor are they replenished unless the captain chooses to have them overhauled. This does not apply to the large trans-Atlantic and Pacific steamers, many of which are not only supplied with necessary medicines and appliances, but also employ a medical officer on board. The small coasters are provided with nothing in the shape of medicine except, perhaps, "bitter salts," which is poured down the men for every disease complained of. No vessels, large or small, so far as reported, are provided with accommodations for sickness or accident to seamen on board. A "sick bay," or "hospital quarters," except in very rare instances, is unknown to the merchantman, although required by law.

j. Provision for the safety of passengers and crews, in time of storm or shipwreck is ample for ordinary accidents, but in case of total destruction or sinking of passenger vessels the supply of life-saving apparatus, &c., is entirely inadequate, andi n some instances the life preservers are out of order, or are in such obscure places that they cannot be found when needed, while the small boats are frequently the receptacles of odds and ends and are not available when needed; nearly all emigrant vessels are insufficiently supplied in case of total destruction of the vessel.

Under the second heading, "Seamen on shore" (*a*), there was but one opinion expressed, and that an adverse one, as to the character and habits of seamen on foreign-going sailing-vessels as well as on many of the coasters and steamers, though at the extreme northern ports, and one or two southern ports, and on the lakes, a better class of men usually follow the sea, and many of them are heads of families.

b. Seamen's boarding-houses are of all kinds, from the lowest dens and dance houses frequented by the worst classes to quiet and respectable "homes"—the greater proportion being of the former kind. The charges range from $4 to $7 per week, and the food furnished is plain, but usually abundant, though badly cooked.

c. Ventilation is a subject not considered, and the crowding of many persons into a small, dark room on shore is frequently worse than the "horrors of the forecastle."

d. Boarding-house keepers and shipping agents are regarded by Surgeon H. W. Austin, U. S. M. H. S., Southern Atlantic district, as "the greatest evil to the health, prosperity, and welfare of the merchant marine that exists; they rob the sailors of their scant earnings, deprive them of their freedom, and ruin their health as well as morals; they control and furnish the majority of crews shipped, and charge the sailor from $2 to $5 for securing him employment; they board all vessels when they arrive in port, and represent to the men that they can give them the best accommodations, and will guarantee them another voyage; they will get them drunk, charge each one with *all* the liquors consumed and prevent their shipping again until their money is all gone, and the advance wages which they can procure by shipping them on a few weeks' voyage. When they return to port they have no money and are compelled to return to the same or a similar boarding-house in order to obtain board and again find employment. I personally know this to be true, having witnessed it." At some ports the boarding-house keepers and shipping agents form a league, in which it is agreed that seamen who do not patronize certain boarding-houses shall not be allowed to ship. These houses charge $7 per week for board, and if a seaman goes to a cheaper house, or one of his own selection, his "chance" for shipping at that port is lost, and he is forced either to leave the city or board with his worst enemy.

e. The "advance wages" system is regarded by some as a necessary evil, but the weight of evidence shows that such "advances" generally fall into the hands of boarding-house keepers or their agents, and do not go to the family of the seaman or to his own credit, while out of employment. In the language of Assistant Surgeon John Godfrey, U. S. M. H. S., "No matter how much we deplore the condition of 'poor Jack,' made the victim as he is of sharpers on all hands, no one cares to extend the hospitalities of a home to him."

Passed Assistant Surgeon J. M. Gassaway, U. S. M. H. S., District of the Pacific, writes as follows: "The subject of advance wages I approach with considerable hesitation; to my mind it presents the key note of discord between the sailor and the merchant, and the sailor and the public generally. It has proved itself abundantly to be an almost unmitigated nuisance, and on its continuance depends a continuance of the brutal atrocities on the part of boarding-house masters, which are too common to need examples here. If the sailor is ever to be made a reasoning being, he is to be made so through the abolition of the advance system. On this coast, wages are from $20 to $30 per month, and the advance paid is from one to three months' wages—more often the latter. This advance is in the form of a note, payable three days after the vessel sails, by the agent of the vessel at the port whence she sails, and is indorsed to the boarding-house master. The men who have signed the articles are put aboard at the appointed time so drunk, 80 per cent. of them, that they are useless for twenty-four or forty-eight hours. On getting to work the officers rapidly discover that of all the crew that shipped as able or ordinary seamen, less than one-half (less than one-fourth in many cases) of the men who have been paid in advance for two or three months are competent to perform any of the more important duties of the grade for which they have shipped, and, as occurred at this port a few months ago, one-half of the crew shipping as ordinary seamen had never been out of sight of land in their lives before.

"The effect on the crew is no less disastrous: suffering from the effects of his last debauch, brought to a more or less sudden close, sore from the beating his boarding master has deemed necessary to inflict to get him aboard, or to settle a disputed account, his earliest reflections are, that the lion's share, if not all, of his yet unearned pay for the next two or three months is in the pocket of his betrayer in liquidation of whisky bills at fabulous prices, or the purchase of some articles of his 'kit,' the worthlessness of which may be gathered from the fact that it is necessary to replenish it every voyage. A man under such circumstances cannot perform his duty readily—sulky, illhumored, as slow as he dare be, careless, designedly inefficient, is it singular that the largest number of sea-going vessels that are wrecked are lost on their outward passage?

"The advance wages system is the curse of the seaman. No one profits by it except the boarding-house master and his satellite. It is a direct and powerful incentive to scoundrelly shipping-masters to drug and intoxicate boys and old men, epileptics and maniacs (one such case having been brought to this office within a month or two), in order to get their advance. The best interests of all concerned make it imperative, in my opinion, that legislation looking to the entire abolition of the advance system be at once had. Stern necessity will teach the sailor, as it has taught the farmer, the merchant, the mechanic, the laborer in every other calling, that the wages from the last job must be husbanded until another is obtained. That an advance is not absolutely necessary may be gathered from the fact that the United States Navy and the Revenue Marine are constantly besieged by eager applicants to enlist as seamen for less pay, stricter discipline, and obligations to provide a uniform, than are found in the merchant service, and without an advance, and, he might have added, 'submit to a thorough physical examination before enlistment.'"

(*f.*) The relation of longshoremen to the merchant marine consists in their being the laborers, or loaders and unloaders of vessels, occasionally making a trip on coasters, but seldom going on deep-water voyages. Their habits, tastes, and surroundings are much the same as sailors on shore. Occasionally seamen will engage in this business to obtain ready money, but usually longshoremen are a distinct class who follow no other pursuit. On the inland waters they are called 'roustabouts' or 'rousters,' and some of them are even more deplorable in their habits than the worst old tar.

(*g.*) The estimated number of seamen shipping on American vessels, including inland lakes and rivers, is about two hundred thousand, and the average time employed about eight months in the year.

(*h.*) The closure of navigation, laying up for repairs, and dullness of business during certain months in the year will account for the loss of time above indicated. The effect of the closure of navigation is shown in the increased number of applicants for relief at United States marine hospitals. The total amount of sickness and disabiliity among the merchant seamen, estimated upon the annual reports of the Surgeon-General of the United States Marine Hospital Service, is about 10 per cent. of the estimated number of seamen employed in the merchant marine service—or, in round numbers, twenty thousand—about as many sick and disabled annually as there are enlisted men in the entire Army of the United States.

Under the third heading, among the "preventable diseases" which afflict the seamen of the merchant service, venereal diseases stand first, causing, it is believed, twenty per cent. of the cases treated by the medical officers of the Marine Hospital Service; then follow consumption, rheumatism, malarial fevers, diarrheal diseases, pneumonia, &c. Along the coast of Florida injuries to the chest from "sponge spearing" are reported as quite frequent.

(*b* and *c.*) The remedies that have been suggested are physical examinations, to prevent the occurrence and spread of venereal diseases, and the more careful observance of hygienic laws on board ship and ashore to lessen the occurrence of other preventable diseases.

Under the fourth heading, "The physical examination of seamen" is regarded by all from whom I have heard as not only a proper hygienic measure, but actually one of the necessary forerunners to a better sanitary condition of the mercantile marine.

Assistant Surgeon John Godfrey, U. S. M. H. S., port of Mobile, says: "Certainly every seaman, when shipping, should be compelled to furnish or present a certificate of physical soundness, and such certificate should be made out only by his best guardian—an officer of the Marine Hospital Service—for otherwise there is always in every port at least one doctor mean enough, *for a consideration*, to furnish a health certificate to a seaman with any affliction, from a 'Barbadoes leg' to an 'aortic aneurism.' Such fellows, too, would make out all the certificates, unless prevented by law, as the customers would be brought by boarding-house keepers, with whom they would divide. I do not see, however, how an examination by the proper officers could always be effected, unless each vessel was invariably inspected before going to sea, as many masters of vessels are opposed to having their crews examined and willing to take them without. One master confessed to me that he would prefer one or two sickly men, provided he could get them at reduced wages, as upon getting to sea he could 'drive the others to do their work,' and thereby make the voyage far less expensive. While such heartlessness and short-sightedness exist, you see that there is much to be done, and many obstacles in the way of doing it."

The plans suggested for physical examination are generally those recommended by the writer and published in the Annual Reports of the Surgeon-General, U. S. M. H. S., 1875-'76-'77. They will be briefly presented in another portion of this report. [A recent circular of the Treasury Department, issued by Surgeon-General Hamilton, has inaugurated a *voluntary* plan of physical examination, which, it is believed, will gain friends for the measure, and eventually result in its adoption at all the principal ports.]

(b.) A United States Seaman's Snug Harbor, for aged and permanently disabled seamen, first suggested, I believe, by Surgeon-General Hamilton, is a measure so fully recognized by all persons interested in the merchant marine service, that it is only necessary for me to say that but one expression of opinion was received from all ports, and that a favorable one.

Under the fifth heading, in regard to apprentices, it appears that captains will not be bothered with boys as apprentices if they can avoid it, and as the present law only provides how they shall be indentured and is not compulsory as to their employment, boys are seldom taken as apprentices: hence our American seamen, if educated at all, are self-educated in the science of seamanship, and we have to depend almost wholly on foreigners to man our ships, many of whom can neither speak nor understand our language. This, it is generally agreed, can only be remedied by amending the law so as to make it compulsory on captains to carry apprentices—a certain number to tonnage—and by a new law instituting school-ships for boys.

Assistant Surgeon Godfrey thinks that "unless some barrier be raised against the employment of unsound seamen apprentices will degenerate in the usual length of time into the ordinary broken down tar; those that would stand proof against corruption would, like three-fourths of the American sailors, get to be masters of vessels, leaving the crews to be made up, as they are now, of the other broken down fourth, and of second rate foreigners.*"

(1.) The number of crew to tonnage varies according to the rig of vessel, and peculiar ideas of her captain. One man to each fifty tons is about a fair average for sailing-vessels of four hundred tons and upwards; smaller vessels require more men in proportion; steamers average about one man to each one hundred and twenty-five tons.

(2.) Cubic air space to each man also varies from about 50 or 75 cubic feet in some forecastles to 200 in others.

(3.) Superficial surface, 14 and 16 feet per man, depending on height of cabin, and in compliance with law.

(4.) No hospital accommodations are furnished except in rare instances.

(5.) No bathing appliances for seamen other than hand wash-basins and buckets.

(6.) Water-closets on passenger-vessels are forward, amidship, or aft, and are usually in good order. On sailing vessels, aft for officers, forward (if any) for crew. On the smaller vessels, coasters, &c., *no accommodations whatever exist*, and more than one seaman has fallen overboard from the forechains and been drowned while attending the call of nature.

(7.) No special accommodations are reported as existing on sea-going vessels for the special accommodation of female and infant passengers.

I have thus briefly presented the principal points touched upon by the officers of the Marine Hospital Service, in answer to certain questions. The contributed papers of the above named officers, which have appeared from time to time in the annual reports of the chief of that service, give vivid pictures of the conditions and influences affecting the health of seamen afloat and on shore. In the report of 1873, Surgeon Heber Smith's paper, entitled "The Sailor and the Service at the port of New York," follows the sailor from his arrival in port to his departure upon another voyage, and after his capture by a landlord, who claims him "body and soul" on the ground of advance wages previously furnished, thus speaks of his boarding-house, and the effect of the advance wages system:

"Situated in the very worst parts of the city, * * * in old, dilapidated houses, reeking with filth and overrun with vermin, the sailor is shown to a bunk in a room that has as many double, and in some cases treble, tiers as it will hold, and without the sign of a convenience for the ordinary necessities of life; and that is his lodging place. In the saloon or living room of the house he is surrounded by a crowd of creatures, male and female, in various stages of intoxication; and can it be thought strange if, under such circumstances, he immediately proceeds to get as drunk as his associates? * * * But the curse of the advance wages system does not end with the demoralization, the drunkenness and debauchery, and consequent evil to moral and physical health wrought in the boarding-house. As it seizes upon him the moment the sailor sets foot on shore, so it follows him until he is again afloat, and the world is sick of the details of the methods of shipping crews and the cruelties practiced upon them at sea. * * * Can these evils, which are ruining our mercantile marine, which, by destroying the efficacy of the sailor, are not the least important factors in the production of avoidable shipwreck and disaster, and which are more potent than all else in filling our hospitals, can they be remedied? There has been an attempt to do so by the framers of the shipping act (1872) by placing certain restrictions on the payment of advance wages. But the restrictions are easily evaded, and have done little or no good. The disease is too serious and too deep-rooted to be overcome by half-way measures; only the most heroic treatment will avail. The testimony of all who have studied the subject practically is to the effect that there can be no improvement in the condition of the sailor until the payment of wages in advance is absolutely and effectually prohibited. The only argument in favor of the system which is seriously urged is, that, from the improvident habits of the sailor, it is necessary to furnish him with the means to buy his 'kit' before he can go aboard for any ordinary voyage. This is hardly worth a moment's consideration. The steward, sailmaker, carpenter, and other petty officers, the fireman, coal-heavers, and all others employed in the engine-room of steamers rarely, if ever, receive any advance, while their 'kits' cost much more than those of the ordinary seaman. The general government only can cope with the difficulty. It is worse than useless, in face of the history of the past, to look for any relief from State legislation or from private effort."

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* First-class foreign seamen seldom ship on American vessels.

In another portion of the same paper Surgeon Heber Smith says: "And soon from exposure to the vilest of liquors, and the worst debauchery, he is driven to the hospital, broken down and diseased. Fully 30 per cent. of all cases treated by the marine hospital surgeon are preventable diseases—preventable not in the ordinary sense of that term, but in the much narrower one of being so by compliance with a few of the simplest and most obvious requirements of decent living."

The late Surgeon-General, John M. Woodworth, U. S. M. H. S. in his annual report of 1874, says:

"So long as the average duration of a sailor's life continues to be only twelve years, such low average being largely the result of the food he eats, the clothes he wears, the hole he sleeps in, and the excesses these conditions naturally and inevitably drive him to, so long will continue the cry of 'unseaworthy sailors,' and so long will there be an inadequate supply even of these. Royal commissions on unseaworthy ships, the revival of a twelfth century law of the Italian republics against overloading, the abolition of the advance system, compulsory apprenticeship on merchant vessels, school ships for training boys, and kindred measures may, or may not, be needed in the interests of the mercantile navies of the world. Some unquestionably will be productive of good, but not until sound hygienic conditions obtain in the forecastle will be entirely removed the difficulties which exist in the way of securing and keeping as good a standard of physical efficiency among sailors as is now found in other pursuits."

In the same annual report (1874) Surgeon Heber Smith's paper on the "Hygiene of the Forecastle" contains much of practical value. He says:

"While the ocean is the great highway of commerce, it is also the great highway of disease, and those who frequent its trackless paths too often become veritable highwaymen, robbing not only individuals, but communities, of that which is dearest to them (health), by developing and propagating diseases which are thoroughly preventable by the simplest sanitary observances. The forecastle of the ship is to this hour *the* neglected point of sanitary police. The absence of effective measures of protection to seamen, notwithstanding the more or less earnest efforts made in that direction, has become proverbial, but it is particularly proverbial in regard to sanitary requirements, because in this respect sailors are so helpless, and the demand for interference is so urgent. Sailors are not brought under sanitary observation as they should be. They come and go. No one cares for them but to use them for the advancement of selfish purposes; and thus it happens, in the ordering of an inexorable logic, that the public weal is jeopardized by the wrongs that the whole world has knowledge of, but still looks upon with indifference and neglect. The dissemination of cholera, small-pox, typhus, yellow, and relapsing fevers, and particularly of venereal diseases in all their varied forms, is probably more to be dreaded from sailors, flitting about from port to port, than from all other sources. It is indisputable that no outbreak of cholera has occurred in this country that has not been imported here in ships, and that the same is true of yellow fever.

"When relapsing fever, that scourge of the poverty-stricken centers of the old world, first made its appearance in this country as a recognized disease, namely, in Philadelphia in 1844, it was shown conclusively to have been brought in Irish emigrant vessels; and as showing the important part sailors played in the dissemination of the same disease when it visited New York in 1869 and 1870, the following extract from the report of Prof. Stephen Smith, made to the New York board of health in the latter year, is most significant: 'Relapsing fever was also discovered at No. 332 Water street, 337 First avenue, and in the forecastle of the steamboat Bridgeport. * * * One of the steamboat hands lodged at 332 Water street, and communicated the fever to the family. On the night of his relapse the sailor lodged with the family of his sister, at 337 First avenue, and after the usual period of incubation fever appeared in the family, and five persons suffered.'"

An illustrated description of the forecastle of the Bridgeport and other vessels is given in this paper which is well worth examination, but space forbids a more extended allusion to this portion of the subject here. Surgeon Heber Smith says:

"The diseases most frequent among seamen of the present day, and which may be considered due in greater or less measure to the influences of their occupation, are consumption, rheumatism, and venereal diseases. The chief factors in the production of the two first are dampness, insufficient and improper food, and insufficient clothing."

The late Surgeon A. B. Bancroft, U. S. M. H. S., in his papers on "Sailors and their Diseases in Chelsea Hospital" (S. G. Report 1874), states, on the authority of Captain Spooner, "an experienced and intelligent ship-master," that, "before the condition of the sailor can be improved it is absolutely necessary that the 'crimp,' 'sailor-runner,' or 'land-shark' should be suppressed, and advance wages abolished, * * * respectable and comfortable boarding-houses established and maintained in every commercial city, and that all others be discontinued or suppressed."

The late Surgeon-General, U. S. M. H. S. (Report 1875), says:

"The prevention or limitation of diseases among seamen has from the first engaged our careful study. At least 30 per cent. of diseases affecting seamen are of a preventable character, and the fact that sailors as a class are, more than any other, propagators of disease, makes the subject of preventive medicine so far as is successfully applied to this class far reaching in its benefits. The application of preventive measures should not be confined to the seaman on shore, but should extend to the sailor afloat. The elevation of the physical standard of seamen, *by eliminating unseaworthy sailors through a system of physical examination before shipping*, and by *improving the sanitary condition of the forecastle*, has been discussed in former reports (1872, 1873, 1874, and contributed papers in said reports), and as one of the results of these discussions some improvement in these directions may reasonably be anticipated through the action of owners and masters of vessels, even if from no higher motive than to guard against pecuniary loss."

In the same report (1875), in the contributed paper of Surgeon Sawtelle, the following occurs:

"If the physical examinations of seamen were enforced on all the vessels of the United States merchant marine, one of the causes of shipwreck—the unseaworthiness of crews—would be thereby removed."

In the same annual report (1875) the writer suggested the following plan for arresting the spread of venereal diseases:

"I. Prevent the introduction of venereal diseases from abroad by so amending existing quarantine regulations as to include the physical examination of seamen arriving from foreign ports—detaining the infected in hospitals designated for that purpose;

"II. Prevent the shipment of seamen suffering with venereal diseases (or other disability rendering them unfit for duty) by requiring the physical examination of such as are bound to foreign ports—with authority to send the disabled or diseased to hospital;

"III. Prevent local infection by establishing, at our larger ports and inland cities, free dispensaries for the treatment of venereal diseases, and for the free examination of those who may have been exposed to them; and, finally,

"IV. Arrest and detain in hospital until relieved all persons who, not availing themselves of the free dispensaries, continue to spread venereal diseases. Such regulations would be beneficial alike to all classes, by excluding foreign importation and diminishing private as well as public infection, and in the meantime securing to our merchant marine healthy and seaworthy sailors."

The late Surgeon-General Woodworth, in his annual report of 1876–'77, says:

"But unseaworthy sailors will continue to be employed until legal provision shall have been made for the physical inspection of the men by medical officers before shipping. The application of the remedy rests with Congress. If put into operation it would work good to all concerned, especially to the shipping interests."

A contributed paper to said report by the writer, entitled "Physical Examination of Seamen," furnishes a pretty full résumé of the subject, and its bearings upon the hygiene of the mercantile marine, a few extracts from which are herewith presented:

"It would seem that, as the safety to life and the security of property depend in a great measure upon the physical condition of those who man our merchant marine, some provision should be made for securing able-bodied and healthy crews for sea-going vessels. Particularly is this evident when it is remembered that a diseased or disabled seaman cannot be replaced in mid-ocean by a sound one, and that the loss of one man's service at a critical moment may seal the fate of vessel, cargo, and crew. The Navy, Marine Corps, and the Life-Saving Service recognize the absolute necessity of such examination, and enforce it accordingly. Those who have witnessed the deplorable physical condition of many of our common sailors, who apply for treatment in hospital, have long felt the necessity of some provision of law by which the reshipment of such men could be prevented. * * * The advantages of a physical examination of seamen are manifold: it is a protection to the seaman himself—by preventing the shipment of a sick or disabled man who might otherwise endanger the life of his shipmates; by the constant scrutiny of his physical condition, thereby fostering his health; by guarding against a short-handed crew, which would impose extra labor on the able-bodied; by weeding out the chronic frequenters of hospitals and devoting the fund to those who deserve its benefits; by raising the standard of crews, men would be more careful of their health and habits, if they knew they were subject to constant medical inspection. It is a protection to the passenger and to the owner of the vessel—by insuring in time of danger efficiency of the crew; by preventing the development of contagious diseases (venereal, &c.) on shipboard; by giving to the owner value received for wages paid. * * * Protection to the seaman, to the passenger, owner, vessel, and cargo are not the only legitimate results of such examination. The public health will be promoted by this means, and a considerable reduction in the death rate will follow. * * *

"Evidence is not wanting to prove that 10 per cent. is a small estimate of the actual loss of life by shipwreck, due to the physical disability of seamen, while the loss to owners of vessels by shipwreck, by delays, and by wages paid for services not rendered, amount to about double that percentage from the same cause.

"Now that we have reached that era when it is more commendable to prevent disease than to cure it, why should not the same principle apply in providing for the 'safety of ships and those who travel in them'? * * *

"No expense to the government, to the seaman, or to the vessel attaches to this measure. The machinery for its economic and successful management already exists. The Marine Hospital Service, through its medical officers, can readily assume and perform all the duties required in making such examination, and furnish medical certificates at every port in the United States where seamen can be shipped by a commissioner or his deputy, as well as at many ports where there is neither commissioner nor deputy."

The "physical examination of seamen" has already been inaugurated, as will be seen by the following extract from a circular letter issued by Surgeon-General Hamilton, and approved by the Secretary of the Treasury; and, although not compulsory, has been pretty generally employed:

"To insure to such owners of American vessels as desire the services of sound and healthy seamen, facilities for the proper physical examination of crews at all ports where medical officers of the Marine Hospital Service are stationed, such officers will, upon the application of any United States shipping commissioner, or of the master or owner of any vessel engaged in the foreign trade, or passenger steamer engaged in the coasting trade, examine physically any seaman or seamen, and give a certificate as to their fitness or otherwise. * * * The provisions of this circular will also apply to enlisted persons in the Revenue Marine, Life-Saving, Coast Survey, and Light-House Services, and to persons desiring to enlist therein, upon the application of the proper officers of the respective services. No fee will be charged by any medical officer for making the examination or certificate herein contemplated." (Department Circular No. 95, 1879.)

I have dwelt thus largely on the subjects of "advance wages" and the "physical examination of seamen" for the reason that I believe them equally important as sanitary measures with ventilation, clean quarters, and good, wholesome food.

Of the unsanitary condition of a large proportion of our merchant ships, so much has been written and said that little remains for me to do further than to briefly call attention to the main features. Beginning in the forecastle and ending in the bilge, we have to contend with sanitary problems not yet successfully solved, namely, how to obtain light, pure air, and thorough cleanliness in all parts of a ship, particularly in a sailing vessel. Unlike a house on shore, windows and outside doors for the free entry of light and air at the bottom of the structure is impossible; nor will either fresh air or sunlight from above penetrate the hold of a large vessel, however she may be constructed, unless artificial means be employed to conduct the one and reflect the other into her retreating depths. Even then the bilge remains a source of constant danger; sipage, accumulations of drippings and filth from cargoes, not only along the keelson but far up the sides of the vessel, where offensive accumulations may be lodged, with no perfect means of reaching them, render our vessels, even under the most careful management, a source of anxiety to the sanitarian, and a harbor for disease and death-dealing emanations.

In the discussion of what legislation or other means are desirable or expedient to promote the sanitary condition of the merchant marine, it will first be necessary to inquire into what legislation bearing upon this subject already exists.

The government assumed charge of all aids to navigation by act of August 7, 1789, and the limitation of disease on ship-board was made a subject of national legislation as early as the year 1790, when a law was passed which, with the modifications made in the years 1805 and 1872, provides that every vessel belonging to a citizen of the United States, bound from a port in the United States to any foreign port, or from a port on the Atlantic to a port on the Pacific, or *vice versa*, shall be provided with a chest of medicines, put up by some apothecary, and accompanied by directions for administration.

Vessels engaged in the whale or seal fisheries are required in addition to be provided with a sufficient quantity of lime or lemon juice, and also sugar and vinegar.

or other anti-scorbutics, to be served out to every seaman within ten days after salt provisions have been served out, &c.*

In 1798 the care of sick and disabled seamen on shore was provided for by a monthly tax on the wages of such seamen, and annual appropriations to meet deficiencies were made by Congress from time to time; of late years, however, since 1874, no appropriations by Congress have been required for this purpose, as the reorganiztion of the Marine Hospital Service in 1871–'72 (placing it under medical supervision) has resulted in its becoming almost self-sustaining, and sick and disabled seamen are now cared for at more than a hundred ports of the United States.

Early provision was also made for the return of destitute American seamen from foreign ports, furnishing them subsistence and passage at government expense.

Under the laws regulating commerce and navigation many provisions looking to the preservation of health upon sea-going vessels have been enacted: Section 4252, provides that vessels shall not carry more than one passenger to every two tons, not including children under one year; that 16 clear superficial feet of space shall be allowed each passenger on main or poop deck, if height between decks is not less than 6 feet, and that 18 such feet shall be allowed on lower deck (not orlop) if not less than 6 feet between decks, but that no passengers shall be carried on any deck less than six feet; on two-deckers, where height is 7½ feet between decks, 14 superficial feet shall be the proportion required for each person.

Section 4254 provides that one hospital "*may* be prepared," &c., but shall not occupy more than 100 superficial feet of deck or platform.

Section 4255 provides that no vessel shall have more than two tiers of berths, the bottom one not to be less than 9 inches from deck, and each berth to be 6 feet long by 2 feet wide, to be occupied by one person, or double that width may be occupied by two persons.

Section 4256 provides for a house to be placed on the upper deck over the passage way leading to the apartments allotted to passengers below decks on all vessels of sufficient space to carry fifty passengers (according to law) other than cabin passengers. Those carrying 150 passengers to have two such houses.

Section 4257 provides that every such vessel with space to carry one hundred passengers shall have at least two ventilators to purify each apartment, one in the after and the other in the forward part of such apartment; one to have an exhaustive cap to carry off foul air, and the other a receiving cap to carry down the fresh air, &c., but if the vessel is equally well ventilated by other means it will be deemed a compliance with the law.

Section 4258 provides for cooking ranges, &c.

Section 4259 fixes a penalty for not having house or houses over passage way, or to be without ventilators.

Section 4260 provides for the amount of food to be carried.

Section 4261 penalty for not having provisions and water in sufficient quantity.

Section 4262 provides that the food shall be well and properly cooked daily, and served out and distributed at regular and stated hours.

Section 4263 requires the master to maintain good discipline, and such habits of cleanliness among passengers as will tend to the preservation and promotion of health, &c., apartments to be kept in a clean and healthy state; owners to construct vessels so that all parts can be thoroughly cleaned; also, provides for a safe and convenient privy or water-closet for the use of every one hundred passengers; also, in bad weather and such other times as he may deem necessary, cause the deck occupied by passengers to be cleaned with chloride of lime or some other equally efficient disinfectant.

Section 4264 provides that collectors of customs shall appoint and direct one or more of the inspectors of customs to examine such vessel, and report in writing whether the requirements of law have been complied with.

All former sections by act of 27th February, 1877, were extended to apply to all spaces for steerage passengers in vessels propelled in whole or part by steam, the collector to report examinations in same manner as above.

Section 4265 makes the above apply to vessels bound to the Pacific coast, except as to food and water, but they shall furnish the same in sufficient quantity.

Section 4266 requires a list of passengers, giving age, sex, and occupation, the part of vessel occupied, the country to which they belong and to which they expect to become an inhabitant, and whether any have died on the voyage, to be reported upon arrival under penalty of same neglect as failing to report her manifest.

Section 4272 requires the collector of customs to examine each emigrant vessel on its arrival at his port, and ascertain and report to the Secretary of the Treasury the time of sailing, length of voyage, ventilation, number of passengers, space on board, their food, native country of emigrants, number of deaths, age and sex of those who died during the voyage, together with his opinion of the mortality, if any, on board, and if none, what precautionary measures, arrangements, or habits are supposed to have had any, and what, agency in causing the exemption.

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*This also now applies to foreign going vessels generally.

The following provisions guarding the rights of mariners and incidentally affecting their health is also given:

"SEC. 4607. If within twenty-four hours after the arrival of any vessel at any port of the United States any person (then being on board such vessel) solicits any seaman to become a lodger at the house of any person letting lodgings for hire, or takes out of such vessel any effects of any seaman except under his personal direction and with the permission of the master, he shall for every such offense be punished by a fine of not more than fifty dollars, or by imprisonment for not more than three months.

"SEC. 4609. If any person shall demand or receive, either directly or indirectly, from any seaman or other person seeking employment as a seaman, or from any person in his behalf, any remuneration whatever other than the fees hereby authorized for providing him with employment, he shall for every such offense be liable to a penalty of not more than one hundred dollars."

Under the heading of "Protection and Relief," provision is made in case the mate or first officer under the master and a majority of the crew of any vessel discover that said vessel is too leaky, or otherwise unfit in her crew, body, tackle, apparel, furniture, provisions, or stores to proceed on the intended voyage, that the matter shall be inquired into, and if found true the seamen shall be discharged and are entitled to three months' extra pay.

A penalty is attached to furnishing unfit provisions, or water, or to a reduction in the quantity of either, and every vessel is required to have on hand at least one suit of clothing for each seaman.

The public health laws and recent legislation on quarantine requires no mention here. The foregoing pretty fully covers the provisions of law bearing upon the hygiene of the merchant marine.

RECOMMENDATIONS.

Without further study into the subject of ship-building, and without practical experimentation in ship ventilation, I will not venture to suggest any radical changes in ship-construction; but there are one or two practical points, requiring no material change in the construction of a vessel, that I propose to touch upon, viz, the placing of "deck houses" on the spar or upper deck of all vessels,* so constructed as to be easily ventilated in all kinds of weather, well lighted with windows upon at least three sides, to contain no bunks nor chests, but to be supplied with hammocks and canvas bags (for clothing), to have a stove, tables, stools, and other articles of furniture necessary to render it comfortable for the use of seamen, and to always be kept neat, clean, and dry as possible.

It has become an axiom among the medical officers of the United States Navy that a "dry ship is a healthy ship," and that the "everlasting deck swashing," usually practiced on naval vessels, not only does not cleanse the vessel but actually renders her unhealthy. It would seem that some regulation governing this practice in the merchant marine should be established to prevent a constant deluging of the decks of vessels in the vain effort by this means of keeping them clean.

The humidity of the air caused by constant deck washing is one of the chief sources of respiratory disease on ship-board.

The vessel should also be kept as free from bilge water as possible, and the vents from the bilge should never open into quarters or between decks. Putty, paint, and shellac will aid in keeping this portion (between decks) of the vessel clean. As artificial ventilation has to be depended upon for the hold of vessels, I have no new plan to suggest, unless it be that ship-building be improved by basing it upon hygienic principles, as is now done in house-building on shore, employing a sanitary inspector to look after the details, and permitting no registry to a vessel until her master proproduces the certificate of such sanitary inspector.

In regard to the provisions and water furnished sea-going vessels, although little complaint has been made it is reasonable to believe that where no authorized person inspects these articles they may not always be of the first quality. I would suggest that an inspection not only of the water but also of the tanks containing it (and from which it is delivered, if by water-boat) be required, and that the United States Navy ration be substituted for the food now supplied to merchant seamen, and that the same be subjected to rigid inspection by an authorized agent of the government before leaving port.

The medicine chests now required by law should be placed under the care of the medical officers of the Marine-Hospital Service, whose duty it should be to make frequent inspections, certifying to the fact when they are fully supplied with proper medicines (as contemplated in section 4569 Rev. Stat.), and the surgeon-general of said service has in contemplation a list of the medicines required and a book of directions for the proper administration of the same.

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*Of late years this plan has been adopted by many sailing-vessels.

Provision for safety in time of storm or shipwreck might be improved by the substitution of mattresses which would float, such as cork mattresses, or what is probably better, "Ostermoor's Elastic Mattress," now in use in the Navy. And all cabin doors should be so made as to be readily unshipped and used as floats.

Seamen on shore, as will have been observed from the various reports quoted in this paper, are a peculiar class, and are sadly in need of national legislation for their protection.

In the shipping act of 1872 it was supposed such protection was attained, and so it was in a measure, but the amendments secured for it the following year left "poor Jack" where he was before, only worse, for it gave him a law with an exception which placed him legally at the mercy of the shipping broker.

It is suggested that section 4504 Revised Statutes be eliminated of its proviso, omitting all after the penalty clause; it would then read: "Any person other than a commissioner, under this title, who shall perform or attempt to perform, either directly or indirectly, the duties which are by this title set forth, as pertaining to a shipping commissioner, shall be liable to a penalty of not more than five hundred dollars."

It is also suggested that sections 4607 and 4609 Revised Statutes (given in full on a former page of this report) *be enforced*, thereby protecting the seamen in their rights to shipment without having to pay "blood money" for a "chance"; and that sections 4531-'32-'33, and '34 be stricken out of the Revised Statutes, and a law substituted abolishing the "advance wages" system. Too much importance cannot be attached to these measures; in fact, they underlie the whole groundwork of the future of our merchant marine, and upon the enforcement of the one and the abolishment of the other depends much of the efficiency of the service.

Next to the above necessary reforms, and perhaps equally important and far-reaching in its effect upon the future of the mercantile marine, I regard the physical examination of seamen before shipment as a hygienic measure of the greatest importance (in a business point of view it stands first in importance). I would therefore suggest that the physical examination of seamen before shipment be made compulsory, and the management of such examination be placed under the direction of the Surgeon-General of the Marine-Hospital Service, who has already inaugurated its voluntary observance.

National legislation is much needed in providing a home for aged and permanently disabled seamen, and it is suggested that a United States snug harbor be established at some convenient point, where this class may be cared for in like manner with other of the nation's wards whose lives have been imperiled for the nation's benefit.

In order to increase the efficiency of the merchant marine it is suggested that training-ships, or schools for boys similar to those authorized for the Navy, be established at convenient points; and also that masters of vessels be compelled to carry, proportioned to the tonnage, a certain number of boys as apprentices—of course a physical examination of the boys should be required in each case, preparatory to shipment.

As a sanitary measure it is believed that the cubic air space for seamen should never be less than 200 feet per man, and that a "hospital bay" should be required on all vessels carrying large crews, and on passenger vessels it should be located amidships and on the upper deck.

Bathing accommodations on large vessels and water-closets on documented vessels of all classes should also be required by law.

The abuse called "shanghai-ing," which is prohibited by law, should be enforced, and a severe penalty attached to its perpetration. This practice consists in shipping a man against his will, or while drugged or drunk.

Respectfully submitted.

P. H. BAILHACHE,
Surgeon, U. S. M. H. S.

WASHINGTON, D. C., *December* 15, 1879.

APPENDIX L

REPORT ON MALIGNANT DIPHTHERIA IN NORTHERN VERMONT.

BY DR. E. HARRIS.

DEAR SIR: In compliance with instructions from the Board I have visited the district of Northern Vermont, in which the alarming sickness and mortality were reported, and which, from the suddenness and fatality of the outbreak, was attributed to the pollution of a stream.

Proceeding to visit the locality as soon as practicable after receiving your official request, I conferred, while on my way, with Prof. Henry D. Holton, of Brattleboro', and Dr. C. G. Adams, of Island Pond Village, Vermont, as those esteemed physicians had already opened correspondence with me concerning the reported events. Upon reaching the township of Newark, in Calidonia County, accompanied by Dr. Adams, we conferred with the "first selectman," or superior of the town, and began an investigation of every case that had occurred. After three days I had inspected the premises, obtained the evidence and records, as given in the following report:

Returning from the afflicted district by way of Saint Johnsbury, West Burke, and Lunenburgh, for the purpose of conferring, with the physicians and other scientific gentlemen who had been consulted by the people of Newark, all available information and facilities were afforded to me for reviewing the results of my inspection and the records of the outbreak.

The subjoined report may be regarded as complete, with the exception of the record of the last series of events, still in progress, but which ought soon to terminate with the sanitary suppression of the causes that have hitherto propagated and spread the disease. Whatever more occurs worthy of record may be appended to this report as additional information.

DIVISIONS OF THE REPORT.

The information on which the National Board of Health instituted the investigation.
Why the sick families in Newark suspected poisoning.
Brief description of the locality.
Map, diagrams, and lists.
Consecutive record of cases.
The preliminary cases.
The first series, following.
Review of the first series.
The second series of cases.
The third series of cases.
The fourth series of cases.
Notes on the households infected and on those which were not.
Conclusions.

APPENDED STATEMENTS.

First information of the outbreak (A, B, C).
Topography and geology of the district (D).
Forests and products (*d*).
Habitations and domestic conditions (*e*).
Water supplies (*f*).
Climate and meteorology (*g*).
Fungi and animalculæ.
The analysis of the brook water.
Other observations.
Various contributions of information from physicians in Vermont and New Hampshire.
Practical suggestions.

NATURE OF THE INFORMATION UPON WHICH THE NATIONAL BOARD OF HEALTH PROCEEDED TO THIS INVESTIGATION.

In numerous leading newspapers and by letters from competent medical gentlemen in Vermont, the statements concerning a sudden and destructive outbreak of a malignant disease in Northeastern Vermont warranted the investigation which the Board directed me to undertake. Appended statements and letters, marked A, B, and C, show precisely the nature of the information received from sources here mentioned.*

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* See appended statements.

THE ALARM, AND WHY THE PEOPLE REGARDED THE SUDDEN SICKNESS AND MORTALITY AS A TRAGEDY CAUSED BY POISON IN THE WATER.

The township of Newark, Caledonia County, with a population of 600 upon 36 square miles, is reported one of the most salubrious, and its inhabitants are notably temperate, thrifty, and well housed. In the central district of the township, in which dwell 85 persons in 14 households, there were 39 children under 16 years of age, and of these there were 22 who attended as pupils at the opening of the summer term of the common school, May 12, 1879. The school-room, having less than 200 cubic feet of aerial space for each child, was occupied during the usual hours from Monday morning, May 12, till Thursday afternoon of the 15th. It is situated in the bottom of a narrow glen that slopes steeply to the southward, and an eddying and tortuous streamlet flows close along by the rear of the school-house; of this water all the pupils except one drank freely, for the noonday temperature was 80° Fahr. and upwards.

On Wednesday evening several little children of this group were sick, and on Thursday evening several were alarmingly ill with symptoms which to their parents seemed inexplicable. The physician, who was summoned from a distant town at midnight, found his services demanded in four families. The teacher and officers of the school closed its doors on Friday morning, May 16, and before Sunday night, May 18, several of the children were already dying, and 16 out of the 22 pupils were severely sick with the disease, which, before half the number died, caused great alarm. Within three or four days of the beginning of sickness in the families that were thus represented by the pupils the other children and the care-takers in the same families were smitten by the same malady, and at last nearly all who gave themselves freely to nursing the sick, or to the care and washing of the garments defiled by the putrid matters from mouth and nostrils, were violently attacked by the malady, even in the instances in which the dwellings of such persons were several miles apart upon different hill-sides.

Up to the date of my return from the district there had occurred 48 cases and 14 deaths, and other deaths have occurred since my return. These events were adapted to terrify as well as cause deep anguish in so tranquil and social a community. More than half of all the inhabitants were attacked, and 16 per cent. are dead already, while nearly 30 per cent. of the cases were fatal. This has occurred in a section of the township which comprises only one-seventh part of its area and population, and where only one or two deaths in that section, or in the whole township only eight or nine, usually occur in the whole year; that is, where the annual death-rate has steadily been from 14 to 17 per 1,000 of the living, it now, for the period of five weeks, from diphtheria alone, became 140 per 1,000, yearly rate, and in the district itself, had the same rate of destruction continued for a year, none would have remained alive.

The accusation of the water of the streamlet that supplied the school children in that district, and the discovery of obvious causes of pollution of that brook, very readily exaggerated the relation of that suspected source of peril, which the afflicted families denounced in positive terms. This source of suspected defilement of the brook-water was carefully examined, and although the actual causes of the spread of the disease as a virulent contagion are ascertained, as described in this report, the neglect of sanitary care and provisions for that little school-room and its pupils will ever be a most important part of the record of this fatal outbreak and propagation of diphtheria. The explosion phenomena of the outbreak and spread of the contagious factor of the malady certainly depended upon causes which were present in and near the little school-room in the glen. The children of nine of the ten families that were represented in that school became sick from the same infectious malady, and the 16 pupils who went home infected and rapidly succumbing to the disease unquestionably planted the virus in their widely separate dwellings in the valley and on hill-sides. The alarm and grief which in this insulated region called the attention of the National Board of Health have given occasion for carefully investigating and reporting the preventable causes by which diphtheria produces its ravages and seems to become epidemic.

The hill-sides of a mountain district and the domestic and social circumstances of their inhabitants have enabled us to place on record the facts which more completely demonstrate the sanitary problems of control and extinction of the infectious and transportable factor or cause of diphtheria, than could in cities and populous villages be clearly divested of doubt in the line of evidence.

This report comprises, in concise statments, the records of the groups of cases, viz., those cases that constitute the primary group, and those which followed in successive series, a review of the physical circumstances of the households, the locality, and the season, together with an abstract of medical evidence, and the maps necessary for the illustration of the subjects referred to.

THE LOCALITY.

Newark is the most northern township of Caledonia County, Vermont, and is 6 miles square, situated about 60 miles in a northeasterly direction from Montpelier, in latitude 44°25′ north and longitude 70°55′ west. Its deepest valleys have an altitude of nearly 1,250 feet above the level of the sea, while the crests and plateaus of its hills vary from 100 to 300 feet above the beds of the valleys. The eastern side of the town is flanked by a sharp spur of the Green Mountain range, shutting off a view of Mount Washington, and having an altitude 1,700 feet above the sea.

Ridges and smoothed slopes of diluvial gravel and disintegrated calciferous mica schists and the eroded valley and glens that are worn in the latter, as left in the glacial period, now are prolific grass lands and forests. The valleys have a general direction from north to south, bearing eastward, and their streamlets converge to make up the west branch of the Passumpsic River, which flows onward to the Connecticut.

The accompanying map shows the geographical and historical points which are to be mentioned in this report. It presents the outlines of school districts and indicates the location of the dwellings, public roads, hills, valleys, and water-courses in the township.

The outbreak of diphtheria was in district No. 4, and extended to district 2 and 9, and has also been transplanted in a remote quarter of No. 7. The pond and its sluggish outlet in district No. 4 occupy the most swampy depression in the main western valley of the town. That water-way, notably the half-mile south from the Center Pond, with a hundred acres of boggy land on either bank, comprises the most stagnant water in the town.

The map will serve as a road and chart, but the profile view from a standpoint on the most southern hill-side in district 4 shows the several hills and streamlets converging in the valley southward from the school-house and Center Pond.

The small circles inclosing numerals mark the site of dwellings invaded by diphtheria, those which are beyond the limits of the fourth district (Nos. 11, 14, and 15), being the exceptional dwellings, marked like the other afflicted households, by a red circle and number.

CONSECUTIVE RECORD OF CASES.

April 13, 1879.—The family of Mr. A. F. Carpenter, whose dwelling is marked 1 on the map, called a physician from the neighboring town of West Burke, a post village, 7 miles distant, to attend two of his children. There were two children younger than these in the family not then sick. A teamster and his invalid wife resided in the family as boarders. The two sick children, and soon the teamsters wife, were sick and under treatment until the 23d of April. The physician pronounced the disease to be diphtheria. The invalid wife had a difficult convalescence, with her nostrils and mouth loaded repeatedly with the diphtheritic membrane. The husband recovered more rapidly, but with "sore eyes," from which he had not recovered at the time I saw him, six weeks later. One of the children, Emma, aged about 11 years, recovered to such a degree as to be able to run about for a fortnight before the school was opened; but during the few days previously to the opening, and most notably on the day of opening (May 12), both eyes, particularly the eyelids, and conspicuously the outer carithers on one side, were loaded with "an offensive discharge." Pain in the eyes, added to this offensive condition of the eyelids, led the child to stay away from school after her first day's attendance. I saw this child and took her own testimony; and, aside from any events which we know ensued upon her attendance at school, I should have inferred that her ophthalmia was diphtheritic. Probably the teamster, who lived in the same apartments and ate at the same table and had been sick with diphtheria at the same time, suffered this form of disease, as before mentioned, for his eyes were not fully recovered when I saw him in June.

The four cases of diphtheria in the Carpenter dwelling, upon the bog, certainly had a slow and dubious convalescence; two of them were vexed with ophthalmia that continued until June; their sore throats and nostrils gave ample evidence of the nature of their sickness even at the time I saw them; therefore these four will be entered in this report as the preliminary cases. I was unable to trace these to any antecedent cases that would in any manner account for transmission of diphtheritic contagion to them.* But whether this malady may spring up indigenously and take on the contagious quality, or, on the other hand, may depend on the specific germinal matter of the disease itself, conveyed by whatever means possible in air and substance, the occurrence of these from primary cases was obviously natural so far as personal, domestic, and local circumstances were concerned.

The type and history of the ophthalmic troubles must not be overlooked, and we have to add to this the testimony of the patient, Emma, that at the opening of the school she wore the same unwashed chemise that she wore when sick with diphtheria. This is important, if true, and all persons who undertook to test this child's memory and veracity believe her statements.

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* See appended statement q for latest account of preliminary cases.

Having studied these four preliminary cases that occurred in the same apartment, we have now to consider the several series of cases that followed the primary group (whose medical history was supposed to have ended with the third week in April). In recording these successive series we found that the evidence classed them in four distinct and clearly dependent groups. Therefore, in reporting them consecutively, it will be logically correct, as well as convenient, to allow them to appear in four successive series, as we found them on our personal inspection from house to house.

First Series of Cases in May.

The school children.—The common school in district No. 4 opened its summer term the 12th of May, with 22 pupils, and as only one family escaped the seizure of some or all of the children they sent to this school, we will mention these families in their order.

FAMILY OF J. ALDRICH.

In school there were: James, eight years of age; Jennie, five years of age; Frederick twelve years of age. James was attacked with all the throat symptoms of diphthera on Wednesday evening, May 14, and on Thursday night he was very sick. The case proved excessively malignant, the diphtheritic exudation and masses invading all the mucous passages from the lips to the stomach. He died on the —— day. Previous to and closely following this first fatal case the two other little children (not pupils at school) and the father, mother, and an uncle, who constituted the household of eight persons, took the same disease; Jennie, aged five years, was attacked on Friday, the 16th of May, and died on the ——. Frederick, past twelve years old, was attacked about the same time as his sister, and was dangerously sick on Sunday, and died on the 26th of May, after unusual endurance of a virulent form of the malady a full week. He was carefully nursed during the last two days by a gentlemen to whom he was affectionately attached, and who came from a distant part of the township to give his attendance. This boy died on the 26th, and at that date the five other members of the family had come down with the same malady, and made the second series of cases more numerous and formidable than the first series. The residence of this family is marked No. 2 on the map.

FAMILY OF E. MORSE.

Delia, six years and ten months of age, became very sick in school on Thursday, the 15th of May. Symptoms: diphtheritic throat, headache, stiffness, and vomiting. The physician who was called to her at midnight from a distant town had three other families to demand his attention before the next sunrise, May 16. Delia died on the 6th day from attack.

Irving, aged five years, was sick on the 16th and died on the 7th day from attack. Uncontrolled epistaxis seemed to be the cause of his death, after the throat had become clean.

The septicæmia was so marked in both these cases as to give currency to the belief and statement that the flesh was falling from their bodies while being wrapped hastily in blankets for burial immediately after death. The fact that necræmia and excessive sloughing and putridity of the parts attacked by diphtheria rendered the dying children the objects of intense commiseration in such a community sufficiently accounts for the extravagant expressions by which the sufferings of the families were discribed. The father's careful discription of his dying children's symptoms was definite and correct. The residence of Mr. Morse is No. 3 on the map.

THE FAMILY OF JOHN COLE.

Alvah and Frank, four and a half and six and a half years of age respectively, were attacked on Friday, the 16th of May, and died on the fifth or sixth day of their sickness. Their residence is marked No. 4.

FAMILY OF A. F. CARPENTER.

Charles, aged thirteen, who had escaped attack during four weeks of exposure to causes at his father's house, where his brother and sister and Mr. and Mrs. Woodrough were sick, was seized with diphtheria the fourth day of school (at noon). He recovered. This case is in evidence that the conditions that favored his becoming infected at school were greater than at home. His home is marked No. 1 on the map.

FAMILY OF F. SIMPSON.

Carrie and Eliza, aged eleven and twelve years respectively, came down with diphtheria on Friday, May 16. Their residence was nearest the school-room, in the glen. They recovered, but were suffering serious sequelæ of the malady when I examined them, June 12. Their residence is marked No. 5.

FAMILY OF SAMUEL PARK.

Emma and Etta, aged eight and six years respectively, were attacked violently on the last school-day, May 15. The younger girl died on the —— of May. Their residence, upon the crest of the steep hill northwest of the glen, is marked No. 6 on the map.

FAMILY OF J. GERO.

Warren, aged twelve years, the only pupil at school from this large family of ten persons, came down with diphtheria on May 16, and, after a comparatively mild attack, recovered. This is in a family of French Canadians who live much in the open air, and who, fortunately, were only little exposed to this the mildest case of series first. This house is marked No. 7

FAMILY OF L. WILSON.

Clifton Hudson (a boarded child), aged eight years, and Nettie, aged five, came down with the sickness on the 14th day of May. The girl died the eleventh day of her disease. The boy recovered sufficiently to be removed to his father's residence, twelve miles eastward.* The Wilson house is marked No. 8 on the map.

FAMILY OF D. FAIRBANKS.

Mystie, aged ten years, was attacked severely during the afternoon of May 14, the third day of school. As her home was upon a distant and steep hill and her younger sister an object of care, the teacher kindly led these children down home. The teacher and this youngest child had resolutely refused to drink the brook-water, and as each of them mentioned this fact thus early, it is part of this record. D. Fairbanks' house is marked No. 9 on the map.

REVIEW OF EVENTS IN FIRST SERIES.

Of the 22 school children 16 were attacked so nearly at the same time, and were so significantly sick with the same malady, and the mortality was so startling, that panic was inevitable, where in a whole township there was neither a physician nor a clergyman to explain the causes nor assuage the fears of the families in which these events occurred. The death of 9 out of these 16 certified the malignancy of the disease.

The question, whence came the infectious virus of the malady, was urgently asked, and erroneously answered by the parents and their neighbors. That query now admits of a correct reply, yet the circumstances under which the pupils in the school-room by the brook in the glen were gathered into close contiguity during the four hot days, drinking copiously of the polluted water, and crowded into a close little room that stood upon and beside a muck-bed, may fully account for the explosive phenomena of the contagious outbreak and spread of the disease. Besides these local and domestic circumstances there were others, chiefly associated with the intercourse of the family with the people of the towns where diphtheria was present. It is certain that the preliminary cases were slow and imperfect in their recovery.

THE SECOND SERIES OF CASES.

Before the cases in the first series terminated—in death or recovery—and, indeed, at the time when the first two of the nine fatal cases of that series were dying, the second series of cases began to be prostrated. The parents, nurses, and infants in the families of the first series patients or school children cases being now the victims. This second series, exceeding 30 in number, was widely distributed, and wherever it extended beyond the households of the series of school children it took hold of inhabitants of the most elevated and salubrious dwellings, that had no other cause for the presence of diphtheria than such as was accounted for in their voluntary and very unguarded exposure to it in their personal attention to the sick and their defiled clothing. The account of all cases in the second, third, and fourth series, extending to the date of my departure from the district, will here be given as briefly as possible, and with no other details than such as are necessary for identification of the groups and their causes.

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* See sequel in appended statement "Outbreak in Fairhaven."

IN THE ALDRICH FAMILY.

The five members of this family not included in the first series of cases consisted of the two parents, a brother of the father, an infant of seven months, and a son, William E., aged three years. William was attacked with the disease May 19, nearly five days after his brother James came from school sick with it. Death ensued on the fifth day of the malady. The infant, Mary, who had been removed to A. F. Carpenter's for care as soon as its mother became ill, immediately came down and died with the disease. The mother, who became ill while attending upon her three dying children in first series, was taken to a new little cottage adjacent to her own garden, and there was nursed by its occupant and recovered. Mr. Aldrich and his brother, forty years of age, were at the same time sick in the family residence, where four apartments were being occupied by patients. The acre of ground where that house is situated is an alluvial terrace near the foot of a northern hill, the house and terrace looking southward, the cellar being wet from springs, the surrounding grounds sodden with organic matter and covered with the waste of rotting wood, and the well-water and grounds generally being foul with all sorts of excremental soakage. Here was the most populous and virulent focus whence radiated the disease by many carriers.

THE MOORE FAMILY.

A child two years of age was attacked by the disease the day its sister Delia died, May 22. It recovered. The case of another child three and a half years of age who escaped by removal to a distant dwelling belongs to the record of *escapes*. Father and mother seem to have escaped, and the healthy babe born June 4 was still doing well.

JOHN COLE'S FAMILY.

The father, mother, and father's brother, all the family, were seized with the disease the day the two school children were buried. Recovered.

THE SIMPSON FAMILY.

The mother and an infant of two and a half years took the disease while the two school girls of the family were recovering. The infant died on the 6th day of sickness.*

THE PARK FAMILY.

The eldest son, Orlo, aged thirteen, came down severely on the 10th of June, while his surviving sister was recovering. His brother Warren was seized on the 12th instant. I examined him and observed the local malady in the fauces six hours before any other than the throat symptoms appeared. The result in these two cases was dubious up to the 14th instant, since which I have no tidings.†

THE WILSON FAMILY.

The disease of the two school children extended to the four adults in the family These recovered. There was another adult (Mr. Hudson, of East Haven), the father of one of the children, who became slightly ill with the throat symptoms, but he removed with his child to his home eastward of the mountains as soon as they could go safely to themselves.

IN FAMILIES THAT HAD NO SCHOOL CHILDREN.

The cases in the second series appeared as follows:

Mr. and Mrs. McLucas, in the residence No. 10, attended upon the dying in first series, and suffered mild attacks.

FAMILY OF EPH. FAIRBANKS.

George F., aged 31, attending the sick and school children at Mr. Aldrich's, was severely attacked May 26 at his house, 2½, miles away upon the mountain side. His step-mother, Mrs. E. Fairbanks, attended upon him continuously, and his step-brother, Robert, shared in the duty. What occurred to the family subsequently we shall mention. This homestead is marked No. 11 on the map.

Miss L. Bill, a maiden of twenty-eight years, attended upon Aldriches, and became sick at her house, a mile distant. Whether from exposure to cases of children in first or second series is unimportant, as she became sick soon after her attendance upon both at the same time. The children in her home had been exposed in the school, but did not suffer. They had the diphtheria last year in a distant town. That homestead is marked 12.

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* See appended statement "*New group from Simpson family.*"

† See last account in G, appended statement.

Mrs. Gray, aged fifteen and a half years, residing with her mother in a large family (Mr. James Cole's) of field and forest workmen, came down with diphtheria while the Wilson family was recovering. She had been exposed to the personal contagion of the malady only by the visits of the non-resident (Mr. Hudson) who removed his child from the Wilsons, and, more notably, by her mother's laundry work in the little apartment where she was some five or six days before her illness compelled her to call a physician. I saw this case making a slow recovery. The house is marked 13.

Mr. and Mrs. Woodruff.—O. C. Woodruff, aged 23, farmer, residing upon a salubrious high plateau nearly 3 miles southeast from Mr. Aldrich's, after two nights and a day's watching and ultimate attendance of the dying lad, Fred. Aldrich, lay down near the sufferer for some time on the 26th of May. He was seized that day, and has made a slow recovery. Even after his throat and mouth were entirely clear of the diphtheritic membrane, the same virus attacked a slight abrasion upon the back of his hand, and this was still unhealed at the time I saw it, June 12.

Mrs. Woodruff, the heroic but unadvised wife, sent for the most necessary portions of the defiled personal clothing, &c., at the Aldrich house on the 25th of May. She washed and ironed it at her distant and most healthful dwelling, and sent the cleansed garments and bedding to the afflicted house whence it was taken. She became severely ill on the 28th, and was dangerously so before the end of May.

These two cases, and unquestionably the latter one, clearly fix certain important points in history of the incubation as well as portability of the diphtheritic virus. The home of these thrifty people is marked No. 14.

THE THIRD SERIES OF CASES.

Whatever may possibly be true in such cases as those of Mrs. Gray, Miss Bill, and George Fairbanks, who were briefly in attendance on cases (*or in their presence*) in the second series, and had full and positive exposure to the infection from the sick in the first. Mrs. Ephraim Fairbanks, at residence No. 11, attended constantly upon her step-son, George, at their mountain home, where everything was cleanly, fresh, dry, and well kept. On the ninth day of that exposure, worn down with care and toil, she came down severely. She continued to nurse her child at night until her milk failed. She died the morning of June 8, attended by her son (Mr. Roberts) and a vigorous lady friend, Mrs. Kelly, whose residence was 4½ miles distant. The infant, of 22 months, had ceased nursing and been taken from the sick-room three days before the mother died. It became sick the day of that death and followed the mother five days later. I visited this child when dying.

Possibly these cases may be the last of the third series,* though fatal cases of "some sudden sickness" have occurred during the second week of this month beyond the mountain, eastward, whither the school child Clifton Hudson was removed by his father from the Wilson family in Newark, before complete recovery.†

THE FOURTH SERIES OF CASES.

Charles Roberts, aged 18, son of the deceased Mrs. Fairbanks, was sick with diphtheria during the last day of his attendance upon his mother. He convalesced slowly.

Mrs. W. Kelly, a vigorous and heroic woman, whose residence is marked No. 15 on the map, was sick the morning she returned from her attendance upon her dying friend, Mrs. E. Fairbanks; was taken sick while walking home, a distance of 4½ miles. I saw her when dangerously sick with her family around her. Her condition continued critical for ten days, and she convalesced slowly.‡ Special nursing and the exclusion of all needless attendants were advised in this case on the 11th of June. This began the new system of sanitary precautions as supported by the selectmen of the town.

Here terminates the record of cases in Newark, as far as any information could be obtained at the time of my inspection.

There appear to have been 44 well-declared cases. There were 15 deaths, 9 of which were school children of the fourth district.

NOTE RESPECTING THE HOUSEHOLDS THAT WERE INVADED AND THOSE WHICH WERE NOT.

Fifteen households had been invaded by diphtheria previous to my inspection or the district. Eight of them were free from the malady until the school-children brought home the sickness, which was accredited to the school-room and what occurred there. The house marked No. 1 on the map, that certainly had been a nidus of infection for weeks, makes this list of sick school-children's homes number nine, and in these nine households we find the 16 sick pupils. In five of these dwellings there died 9 of the 16 pupils (first series) and 3 other children, but no adults; but in the same nine dwellings 13 adults and 5 children (all of second series) took the disease and survived.

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*See letters from Dr. Carpenter and Mr. Bruce, appended statements.

† See extract from letter of Mr. Bruce, p.—; also appended letters of Dr. Ide and Dr. Carpenter.

‡ See letter from Dr. Carpenter, appended statement.

In the six dwellings invaded by diphtheria, where no pupils were sick, there were 11 cases and 2 deaths, all adults save two, and the fatal cases being Mrs. F. and her child.

In the total fifteen dwellings there resided 92 inmates at the time diphtheria appeared; 48 were attacked and 14 died, 9 of the latter being pupils in school. There were sixteen households in school district No. 4, and cases of diphtheria occurred in twelve of them. In districts 2 and 9 four care-takers of the sick pupils became ill in three dwellings, and in one of these (viz, D. F.'s) the disease was communicated to other persons, proving fatal in two of the latter.

In district No. 2 there are some twenty-six dwellings. The two in which I saw the only cases of diphtheria in that district were as little liable to invasion by it as any of the twenty-six, except that the victims of it had become infected while attending upon the sick elsewhere. The dwelling of Mr. Woodruff (No. 15) is remote from that of Mr. Aldrich (No. 2), whence the infection was contracted. The dwelling of Mrs. Kelly (No. 15) is upwards of 4 miles from No. 11 (E. F.'s), where the occupant of 15 tarried two nights and a day, until she became sick. In the long interval upon the road between the latter two households there reside six families which have not been invaded by the malady, while upon the broad area between the dwellings No. 2 and the homestead of the Woodruffs (No. 15) there reside nearly twenty families who have wholly escaped.

INSTANCES OF ESCAPE BY TIMELY ADOPTION OF SANITARY MEASURES.

The following are worthy of note:

The teacher and one of her pupils.—They refused to drink the water of the brook at the school-room. This is regarded as an evidence of the influence of the polluted water in exciting and aggravating the disease, where all the inmates of the school-room were exposed by some means to the infection.

One of the Morse children.—The aunt of a child of three and a half years, who was most exposed to infection from the sick brother and sister, was removed to a distant district and so carefully guarded by the aunt, who was attending the sick of her sister's family, that she would not come into its presence, in her daily visit home, until after ablutions and an entire shifting of her clothing. Her family and herself, as well as this child, have remained unharmed.

The Woodruff family.—The young couple who became sick (dwelling No. 14) had the discretion to insulate themselves upon the upper floor of the house, and to maintain a scrupulous separation of themselves and all appertaining to them or that was done for them. Physician and nurse enforced this duty perfectly, and with entire protection to the numerous family and to all neighbors. That these were malignant cases was proved by results I witnessed.

Numerous other illustrations of the importance of sanitary measures were found but, unfortunately, the greater part of all the experience in Newark was in evidence of calamitous results of the neglect of such measures in the presence of the sick.(1)

MEMORANDUM OF THE GROUPS OF CASES OF DIPHTHERIA PLANTED BY THE CONVALESCENT BOY HUDSON, AND THE GIRL SIMPSON.

June 26, the following facts were verified by one of the town officers of Newark who had accompanied me in the house-to-house inspection in the latter district. That gentleman reports by letter on the 28th of June, as follows:

(1)* * * June 26 I went over to East Haven and the "Lost Nation" district, 9 miles by road from the district where diphtheria prevailed in Newark, and I found—

1st. Ida Hosford, aged eight and a-half years, after two or three days' exposure to Clifton Hudson, the convalescent schoolboy who had been removed from Mr. Wilson's, in Newark, to his relations on the east side of the mountain, died of diphtheria after being sick five days, the death occurring June 13, at the residence of Mr. Seth Hudson.

2d. Ada Hosford, a sister, three and a half years of age, died June 20, after five days illness. This little girl had been exposed to no one except the mother, with whom she slept at night. The mother nursed Ida when dying (June 13) at Seth Hudson's, whose house is only 20 rods from Mrs. Hosford's.

3d. Hattie Cole, eight years of age, who was daily exposed to the convalescent boy from Newark, as he was now domiciled in her father's house. It was on the 13th day of his residence that Hattie became sick.

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(1)The annexed record of events has been sent in the day of transmitting this report to Washington.

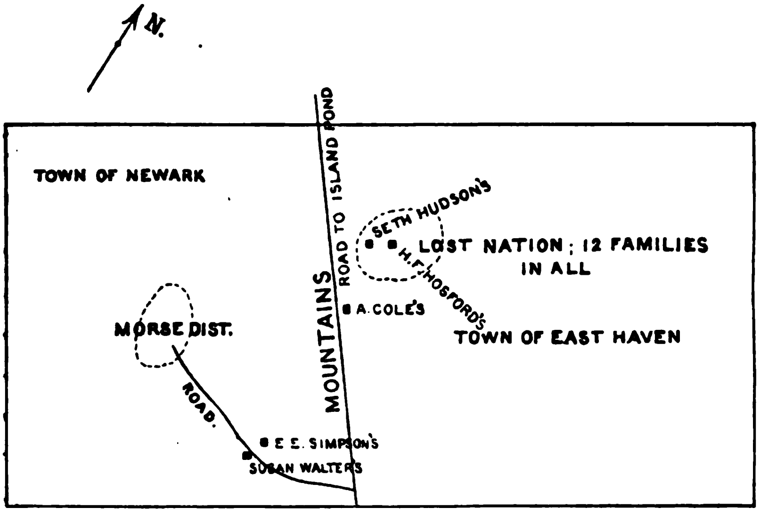
4th. Frank Down, in same family as Hattie and the boy Clifton, was attacked at the same time as the girl.

5th. In another neighborhood nearer to Newark, but 2¼ miles from the "epidemic district" there, Myrtle Simpson, who had been exposed in a visit with Eliza Simpson,(1) who was convalescent and thought nearly well. She was attacked on 25th of June.

6th. Susan Walters was attacked about the middle of June. She has had another exposure than the presence of her mother, who has been much occupied in voluntary care of the sick in the "Newark epidemic." Her residence is 3 miles from that district, and separated by the mountain.

"The first four of these six cases have occurred in an insulated neighborhood containing twelve families; and in the three families in which the disease has appeared there were 16 inmates."

Mr. Bruce furnishes the annexed sketch of the localities here referred to:



E. E. Simpson, 7 in family, 5 under 15 years, 1 sick.
H. F. Hosford, 7 in family, 5 under 15 years, 1 dead.
Seth Hudson, 3 in family, 1 under 15 years, 1 dead.
A. Cole, 6 in family, 4 under 15 years, 2 sick.
Susan Walter, 6 in family, 1 under 15 years, 1 sick.

CONCLUSIONS.

The outbreak of diphtheria in Northern Vermont has presented the usual characteristics of the malady in its malignant form.

The preliminary cases in a single little group in Mr. Carpenter's family, during the month of April, seem to have been comparatively mild, but slow to recover, and attended with an ophthalmic complication that became a source of peril to school-children on the 12th of May.

The polluted water of the brook by the school-house; the crowded little school-room and the damp mucky ground beneath and around it; the surface flow and soakage of the open privy by its side and into the brook from which the children drank; the heated glen in which the noon-day temperature was excessive; the thirst of the pupils and the frequent and copious drinking of the defiled water, together constituted adequate conditions to give fatal activity to the virus of diphtheria in whatever way it was present. That the virus of diphtheria was present is unquestionably certain, and that the immediate infection and rapid sickening of the entire number of pupils who at the time and until now seem to have been susceptible to attack, the malignant progress and fatal termination of the malady in 9 of the 16 who were then attacked, must be regarded as proof of the intensified virulence of diphtheria when excited into renewed activity by agencies such as are described in this report concerning the school-children (or first) series of cases.

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(1)Eliza S. was one of the Newark children who suffered in May, and belonged to the first series of cases. Her convalescence was very slow, and she was the feeblest of all the convalescents I examined. She was poorly clad in woolen garments. The fact is important that of the twelve families in the Lost Nation neighborhood, those invaded by diphtheria (2) were the ones exposed to infection conveyed from Newark; also that the other three families that have suffered on the east side of the mountain have traced their infection directly to the same primary source.

The chemical and microscopical examination of the water of the brook which was accused by the citizens and the public press has only shown that there was sewage pollution.

Inspection of the school-room and the premises about it, of the glen, the dwelling-houses, and all the evidence, warrants the conclusion that the virulence of the infection and the fatality of the cases were caused by the co-operation of these several circumstances which became accessory to the outbreak.

The continuance of malignant virulence and rapidly repropagating activity in the contagious factor, even the fourth series of cases in less than five weeks, in connection with the evidence afforded in the records of each successive series and each individual and group, vividly impress the duty of complete sanitary care of the first cases and groups wherever diphtheria appears.

That the sanitary precautions which have been adopted will soon terminate the progress of the malady in the township of Newark is so probable, that it was deemed expedient to give this assurance, based upon action that was being taken by the medical men and the selectmen.

That the events of this outbreak and of four others which we have recently investigated in rural districts warrant the conclusion that, while diphtheria is apparently liable to appear in almost any region and in remote mountain neighborhoods (especially where it has previously prevailed), from causes which are as yet imperfectly understood, its contagious propagation and malignant prevalence may be prevented by timely sanitary measures. The cheerful and prompt endeavors of the inhabitants, especially of the town authorities and the medical advisers, to give full effect to the necessary sanitary regulations in the care of the sick and of the dwellings and of all who have intercourse with them, is an immediate result worth far more than the labor bestowed in this investigation and inspection in the afflicted district.

The extension of the infecting cause of the disease to an insulated population in an adjacent mountain town will give another series of facts, depending, as we now believe, upon the injudicious removal of the convalescing school-boy from the Newark district to the region here referred to; but as regards the people of Newark, as now advised they can protect themselves with reasonable certainty.

The chief sanitary measures recommended and found practicable by the authorities and physicians are briefly as follows:

1. Regulated and competent nursing by persons separately engaged in such duty; medical regulation of the sick-room and all that pertains to the sick.
2. The separation of all children, and as many others as possible, from the sick-rooms and from all other exposure to the sick and their care-takers.
3. Complete cleansing and disinfection of all things and places defiled by the sick.
4. Temporary seclusion from or closure of schools in the districts in which the malady is present.
5. Instruction of families and nurses concerning the causes which spread the infection and which render it necessary to keep up the sanitary precautions until all signs of the disease disappear in those who are recovering from it.

Fortunately the people readily comprehend such instructions and sanitary regulations, and though it seems to be one of the laws of diphtheria, as a domestic pestilence, that its obviously contagious factor may gain force and a most destructive virulence which makes it sometimes truly epidemic, all well studied experience goes to prove how true it is that the infection and propagating cause of diphtheria is the one essential cause which sanitary science lays hold upon to arrest and to prevent its epidemic prevalence, while all its accessories should also be controlled and abated, for, in the words of M. Gendron, "Lepidémie est l'effet et non la cause de la contagion."

Respectfully submitted.

ELISHA HARRIS, M. D.

JAMES L. CABELL,
President National Board of Health, Washington, D. C.

A.

NATIONAL BOARD OF HEALTH,
Washington, D. C., June 6, 1879.

DEAR DR. HARRIS: I am directed by the National Board of Health to refer to you the accompanying newspaper report of a wholesale poisoning of school children by drinking polluted water, with instructions to visit the locality (Newark, Vt)., to investigate the matter thoroughly, and after returning to submit a report in writing to the board.

I am further directed to say that while on this duty you will be entitled to receive, in lieu of your present pay, a *per diem* of $10, and your expenses not, to exceed $5 a day for hotel charges.

Very truly, yours.

J. L. CABELL,
President National Board of Health.

VERMONT'S SICKENING HORROR—DRINKING FROM A BROOK FULL OF DEAD ANIMALS.

NEWARK, VT., *May* 31.

The number of school children poisoned here by drinking water from a brook into which the carcasses of a dead horse and several sheep had been thrown is 27, instead of 9 as first reported.

Ten of the children are dead, and it is feared that the other 17 will not recover. The stream flowed near the school-house, and the farmer who threw the carcasses into it will probably be arrested. There is the most intense excitement, and crowds visited the houses where the dead bodies lay, but the sight was disgusting, and the corpses were buried as soon as possible after death. The parents of the dead children are objects of general sympathy.

Nearly all the children in the school are down, and it would not be surprising if the men who are in the habit of throwing dead animals into the water instead of burying them would be the subjects of legislation. It is ascertained that a number of persons living along the banks of streams have been subject to typhoid fever and supposed affections of the bowels for years past, while persons who used water from springs and wells on their own premises were seldom affected.

In some villages and towns supplied with water from streams the same thing has been observed, and the matter is attracting considerable attention. It is ascertained that the sewage from barn-yards and stables and the refuse from factories and other decaying rubbish is often purposely turned into streams, without any regard to the well-known fact that hundreds of people must drink the water or none at all.

In many places privies are built out over the water, and every sort of filthy and decaying matter which, if used as manure, would fertilize the earth, is mercilessly dumped into the flowing streams. It has been stated by indignant physicians that pestilential diseases are God's punishment for the wickedness and laziness of the people of whole counties and States who permit such a state of affairs to exist.

Now that the matter is brought home to the people in the neighborhood of Newark, they are horrified at the number of instances in which the laws of health are violated and the lives of whole communities endangered by the lazy people, who throw all dead animals into the water or drag them into the woods to fill the air with pestilence and death.

A farmer near Newark, who buries all dead animals in his manure pile under a shed, says that in the course of a few weeks such bodies are completely absorbed except a few clean bones, and that the fertilizing strength of that portion of the manure is wonderful. Other farmers bury dead animals at the roots of grape vines; but the effect of this is to disgust all persons of weak stomachs who are aware of the fact.

It is alleged that the farmer who has caused this wholesale slaughter of children is in danger of personal violence or even of a trial for manslaughter; but his neighbors say he had not given the matter any thought, and that he has done no more than others in Vermont and many other States have done for years and are still doing.

The people of this part of Vermont are quiet and orderly, but as one child after another dies in agony, becomes a repulsive and bloated corpse, and is hastily buried before it can fall to pieces, the wails of some of the mothers are heart-rending, and the feeling among the men as the news flies around the neighborhood is a very dangerous one for the cause of the disaster.

The indignation is spreading into the towns where owners of factories are pouring the refuse into streams, and old laws on the subject are being hunted up, with the intention of punishing all who have habitually violated them. One prominent manufacturer on Bullock Creek admitted that all the fish in the stream died from the poisonous substances poured into it. In the words of a farmer near Newark, "There is lightning in the air!" and himself and a number of his neighbors are burying such dead animals as may be still above ground.

Another great danger has evidently just been thought of. The carcasses of dead horses and cattle, when dragged out and left in the woods, are devoured at night by dogs from far and near, and for days afterwards they are sullen and dangerous from the effects of their bloody feast. The singular death of a child some time since from blood-poisoning is now believed to have been caused by a pet dog which had been gnawing at a dead horse, having licked his face soon after returning from his horrid feast; and another singular case of the death of a man from the bite of a dog, which was afterwards chained up and found not to have hydrophobia is now explained in the same way.

So indignant have the people become that it is even proposed to memorialize Congress to pass a general law for the prevention of this horrible practice of befouling streams; and it is claimed that, as the yellow fever in the South last year originated from just such a cause, there would be no difficulty in finding strong reasons for its passage.

LATER.

It is now reported that three more children are dying, and the news passes from one to another with remarkable rapidity. A few of the rougher class hint that it would be as well for the farmer who caused the trouble to emigrate without waiting to pack his trunk, but the mass of the people discourage any attempt at violence, as they say he is no more to blame than some of those who now find the most fault.

For the information of Dr. E. Harris.

T. J. TURNER,
Secretary National Board of Health.

JUNE 5, 1879.

[Appended statement.]

B.

ISLAND POND, VT., *June* 2, 1879.

DEAR SIR: The water drunk by the children in Newark was taken from a little brook running from springs on a hill-side. A horse was buried about 75 feet from the brook one year since. The grass from the carcass to the brookside (about 8 feet wide) is much more luxuriant then elsewhere, showing that the influence extended to the brook. This is about 2 rods above where the children took the water. The sewage from a farm barn and yard entered the brook about 20 feet above the place where the water was obtained.

Diphtheria of a mild type had been in the district for four weeks before the school commenced. No fatal cases. School commenced May 12; most of the cases were taken from the 14th and 17th; 22 scholars; 17 sick; 8 deaths; 3 deaths of children who had not attended school—making 11 deaths in all; 5 now sick, but with a fair prospect of recovery.

I saw some of the cases on the 19th day of May, and again yesterday, June 1. The disease differed in no way from epidemic diphtheria that I have repeatedly seen. That the water was poisoned, I have no doubt. That it determined the nature and type of the disease, I cannot admit. That it had much to do with the *fatality* of the disease, I can readily believe.

Yours, truly,

C. G. ADAMS, M. D.

DR. HARRIS.

[Appended statement.]

C.

SAINT JOHNSBURY, VT., *June* 2, 1879.

MY DEAR SIR: I am in receipt of your favor of the 30th ultimo, and have written by this mail to Dr. Holton upon the matter of an investigation and a report of the poisoning case in the town of Newark. I think Dr. Holton will give attention to the matter at an early day and report to you.

I am yours, very truly,

HORACE FAIRBANKS.

ELISHA HARRIS, M. D.

[Appended statement.]

D.

Topography and geology of the district.
Forests and products.
Habitations and domestic conditions.
Water supplies.
Climate and meteorology.
Chemistry and microscopy of the brook water.
Other recent outbreaks and records of diphtheria in Vermont.
Records contributed by physicians.
Lessons from these outbreaks.
Sanitary instructions needed by the people in the districts afflicted with diphtheria.

TOPOGRAPHY AND GEOLOGY OF THE DISTRICT.

The surface geology of the district and of the entire township may be described as belonging to the *schist* formation, and the soil as being made up of the fragile and decomposed *schists* and the diluvial gravel and bowlders from the granitic regions northward. The central portion of the town is marked by a deeply eroded valley of variable breadth extending from the line of ponds, as marked on the accompanying map, southward, and having several accessory and converging valleys and glens, like that where the school-house in district 4, and that in which the three starch factories are. The hill-sides and crests of the smoothly-rounded ridges above the valleys are the favorite sites of dwellings and are the best farm-lands.

A steep mountain spur extending southward along the eastern border of the township has an altitude of nearly 500 feet above the waters of the east and west branches of the Passumpsic River, whose confluence is at the southern point of the spur. Springs of water appear at frequent intervals along the hill-sides. The boggy flanks of Central and Mud Ponds and their sluggish outlet, in the midst of which the preliminary group of cases of diphtheria occurred, is the most salubrious region in the township. The periphery of that boggy area is marked on the map by a double line of black points.

The calciferous mica-schists of the mountain-sides have contributed the basis of a soil that with the humus and alluvium of the deep valley of this outlet makes the boggy ground. Elsewhere than in the valleys, which are narrow and tortuous, the surface geology resembles the sand-stone regions which have been subjected to glacial action. Yet these schists are older than the granitic upheavals which have penetrated the thick strata of the former, and now appear as mountain crests. The entire region northward from the town of Newark and the headwaters of the Passumpsic, in Vermont, *i. e.*, the water-shed northward towards the Saint Lawrence, is granitic, and is very deeply eroded, so that it is a wilderness of ponds and lakes which rest on granitic bowl-bottoms, the worn gravel from which now constitutes the beautiful ridges or farm-lands of the regions southward.

The water-courses are now traced in the pathways of the old flow of a glacial period, and the streams have a very tortuous course. The streamlet in the school-house glen of district No. 4 issues from springs and preserves its purity until it receives the farm-yard soakage and the sewage filth of the ditch and the school privy.

Though there are numerous factories for making starch from potatoes located in the upper valley of Newark, and the numerous saw-mills cast into the streams on which they are located a vast quantity of saw-dust and waste from the mills which becomes mixed with the pulp that is cast away from the potato-starch factories, the water-courses, except from these causes, are quite free from nuisances. Copious springs supply nearly all the families and fields.

FORESTS, FARMS, AND PRODUCTS.

Pines, larches, red cedars of great size and value, hemlock, maples, beech, and a great variety of cherry constitute the forests. But these have been so denuded that the hills are bare in most places, the woodlands covering only a small fraction of the lands available for culture and pasturage. The farms are devoted to grazing and the production of the spring cereals and potatoes (the latter for the manufacture of starch), and they enable the farmers to live comfortably and have large families. Food supplies are of excellent quality, and no blights or fungoid parasites afflict the fields.

THE HABITATIONS.

The rural cottage, built of wood, and usually having an extensive wood-shed for the grains, fuel, a dairy room with its appurtenances, and lastly and at the extremity of the line an earth-pit privy, with farm buildings or shops, &c., further removed from the domicile, make up the structures of the homestead. It is a notable fact that, while the outbreak in school district 4 spared no household because of its cleanliness or healthfulness of situation, the excessive mortality occurred chiefly in dwellings the worst kept, and where the yards and outhouses were neglected. The preliminary cases and the first few deaths occurred in the midst of exceptionally unclean surroundings. The latest two series of cases I visited certainly were found in the midst of domestic comforts and habitual cleanliness. The virus of diphtheria had selected its victims according to the degree of their individual exposure, and without regard to any special conditions that may have been present or absent at domiciles where they reside.

WATER SUPPLIES.

With the single exception of the school-room, scarcely a house is destitute of a copious supply of pure spring water that is conducted to the domestic hydrants under high pressure of gravity.

CLIMATE AND METEOROLOGICAL FACTS.

The mean annual temperature in this region of highland valleys is about 41⅓° Fahrenheit. Snow is deep in winter, and it covered the whole region this year until late in April. The records of temperature and humidity at the nearest station corresponding with this district in geographical position and altitude, viz, in the town of Lunenburg, read as follows for the ten days the outbreak was coming to its maximum intensity:

Date.	Noonday temperature, Fahrenheit.	Humidity, 100 being saturation.
	°	
May 12	78	32
May 13	85	40
May 14	81	35
May 15	74	80, showers.
May 16	70	70
May 17	72	65
May 18	74	50
May 19	75	68, showers.
May 20	65	45

This record suffices to show that the weather was intensely hot and dry during the four days the school in the glen was in session, from May 12 to 15, and that the heated term continued. Vegetation advanced rapidly, and, in the narrow little valley in which the children were at school, the heat was much greater than was marked by the observer who has kindly furnished the annexed record of temperature.

ATMOSPHERIC AND PARASITICAL FUNGI.

Professor Cutting, the State geologist, and eminent as a naturalist and teacher, resides in a neighboring town, and by his courtesy we are informed that "the entire region is remarkably free from any of the minute cryptogamia which are manifested as blights and molds, or that otherwise produce visible effects; that the blights and mildews which are sources of danger in the Lower Valley of the Connecticut River are rarely found in this highland region, and that even the *Puccinia graminis*, as usually found in abundance in the lowland districts and where the cereals are grown, have seldom produced any obvious effects in this region of Vermont.

THE CHEMISTRY AND MICROSCOPY OF THE BROOK WATER.

The streamlet which was so much accused of being the cause of the fatal outbreak among the school-children has its source in numerous springs up the glen in the woodlands. Samples of the water from the woodland portion of the stream just above the point where the soakage from the meadow and barn-yard have remained for four weeks free from odor and from any growth of algæ and other visible organisms; while the samples which were taken at the same time from the places at which the school-children obtained water are found to have become intolerably offensive, and to have become densely turbid with spore-growth and animalculæ. Five or six samples of the water from the last-mentioned places in the brook were submitted to Prof. Hiram A. Cutting, for analysis, by the selectmen of Newark, who hoped, by the help of the professor's explanations and account of his analyses, to quell the panic, and either to disprove or justify the current accusations in the district. By Professor Cutting's kindness I am permitted to present the annexed statement of the results of his analyses:

APPENDED STATEMENT OF THE CHEMISTRY AND MICROSCOPY OF THE WATERS OF THE BROOK IN NEWARK.

STATE OF VERMONT, OFFICE OF STATE GEOLOGIST,
Lunenburg, June 14, 1879.

MY DEAR SIR: On May 29 I carefully examined the water brought me from a small stream in Newark. I found 24⅔ grains of impurity to the gallon, consisting of animal, vegetable, and mineral matter. The water was slightly ammoniacal, containing a trace of chloride of sodium, but no salts of lead or copper, and but slight traces of iron. Animalcule life as it appeared under the microscope was abundant, including Ratifers, Daphnia pelex, Hydrachna, and other common varieties. It was, as the tests show, but slightly contaminated by sewerage, and the impurities from animal, vegetable, and mineral matter was no greater than is usual in the small streams of Vermont in the spring-time. While I consider it unfit for drinking purposes, I find nothing that would seem to be immediately detrimental to health.

In the water as it came to me were the usual algæ found in what is supposed to be our purest waters. The most abundant was "Batrachospermum moniliforme." I also found in connection species of the Volvox; but nothing in the vegetating life that was abundant and in vigorous growth that would indicate any uncommon condition of the water.

Truly yours,
HIRAM A. CUTTING.

To E. HARRIS, M. D.,
For National Board of Health.

OTHER OBSERVATIONS.

After conferring with all the educated physicians who had made observations in the town or among the sick during the season, I ascertained that nothing unusual or worthy of note seems to have marked the occurrences in nature, or among the people, the past two months. The diseases have been of a mild type; enteric fever has not been prevalent, though it is the malady most feared among the people. Diphtheria seemed to have nearly disappeared until April and May, and only a few small groups of cases of it have yet been reported in this region of Vermont, but none so destructive as this in Newark.

The season has been peculiar in the suddenness of the advent of hot summer weather the second and third weeks in May, before the ice had disappeared from the neighboring mountains.

The very nicely exact observations of Professor Cutting upon the presence and variations of ozone in the northern regions of Vermont have warranted him in stating that for many days in May it was entirely absent on several days; yet this, he says, is not unusual at the beginning of summer in these mountain towns. It is a fact to be noted that the several days of excessive heat, beginning May 11, were exceedingly dry, the hygrometer marking as low as .35 of saturation, while shortly before the earth was flooded by rain. The outbreak of diphtheria occurred just at the time when the minute fungi could be most favored.

OTHER OUTBREAKS OF DIPHTHERIA THIS SEASON.

In the town of Barre, 70 miles southwestward from Newark, and Tunbridge, some 80 miles south, sharp and fatal outbreaks have occurred, and caused the closure of the district schools. These manifestations have not ceased. It was noticed last year that several insulated cases and small groups of sufferers from diphtheria occurred in the five northern counties of Vermont and in the two northern counties of New Hampshire. The chief of these records are appended under the head of "Recent outbreaks in Northern Vermont and New Hampshire." Special importance attaches to the record of that in Northumberland, N. H., where 110 cases occurred in one school district which I visited. (See statements E, F, G.)

LESSONS FROM THESE OUTBREAKS.

Though diphtheria has prevailed in the State to some extent from 1858 until now, its specific self-propagating virus was not generally recognized until recent years among the country physicians. In 1863, when it destroyed nearly 1,400 lives in the State, this contagious attribute began to be anxiously noticed; and in 1866 Dr. A. J. Hyde, of Sutton, reported for the committee on epidemics in Caledonia County, to the State Medical Society of Vermont, that diphtheria had attacked some patients upon abrasions on the hand, the ankle, the os uteri, and in one instance, with fatal blood-poisoning and death ensuing, it had attacked the eyes. That report awakened the medical profession to the duty of more closely observing the first cases and first groups of cases, and carefully recording the progressive events of the local outbreaks and epidemics of diphtheria.

To facilitate the inquiries now in progress respecting this malady, and also add valuable facts in connection with this report, we here refer to recent investigations by most trustworthy medical observers in the regions of Northern Vermont and New Hampshire, where the present outbreak occurred, and may be permitted to add some further testimony from the physicians in those regions, who have voluntarily opened correspondence with the National Board of Health upon this subject.

Dr. S. H. Colderwood's report.—A valuable study of 55 cases of diphtheria occurring in a region some miles southward from Newark was contributed to the Vermont State Medical Society two years ago by the late Dr. Colderwood.[*] The events of the Newark outbreak, like those of numerous epidemics of diphtheria, have prepared the people in the regions afflicted, and probably the entire State, to accept and act upon the necessary sanitary instructions for repressing and preventing the propagation of the contagious and all known accessory factors of this malady. The numerous physicians and other enlightened citizens whom I met in the North have expressed an earnest wish that a State board of health shall be organized in every State.

Note upon an outbreak of diphtheria in the town of Northumberland, N. H.—Hon. Dr. J. A. Watson, a member of the legislature of New Hampshire, communicates the following facts concerning the remarkable prevalence of this disease in the district where he resides: In the little hamlet of Groveton, where the Grand Trunk Railroad touches the Connecticut River, diphtheria appeared in a public school, at which 125 pupils were in attendance, in May, 1878. The local conditions under which the disease rapidly spread to 25 of the pupils, regardless of the domestic relations and distance of their families, induced me to inspect the locality and the great school-house in the mountains, for the special facts which Hon. Dr. Watson has since contributed seemed to be very important, as communicated to me by a citizen of that district.

GROVETON, N. H., *June* 30, 1879.

DEAR DOCTOR: Your letter received, and should have answered before, but have been sick, and am not yet well. I inclose you a rough diagram of the field of the epidemic of which you write, and also some points relating to its origin.

Respectfully,

J. A. WATSON, M. D.

"On the 12th day of May last a case of diphtheria made its appearance in a family of means and respectability in the village of Groveton. Everything around the premises was neat, clean, and orderly, and the hygienic and sanitary surroundings were above the average. The patient was a boy about eight years of age. There was no other case of diphtheria in town, and no connection between this and any other case could either directly or indirectly be traced. The boy was attending school at the time of the invasion of the disease, and was in excellent health.

"On May 19, seven days after the onset of the first case, a little girl about ten years of age was taken with the same disease. This patient lived nearly a mile from the first case, a little out of the village, on a farm. Here the sanitary conditions were also good, though the case was of a most malignant character, and the patient died on the sixth day after the invasion of the disease. This little girl was also attending school.

"May 21. Another case, remote from the other two, and in no way exposed to the former cases; was attending school.

"May 22. Two new cases in different localities, remote from all former cases; both scholars.

"May 23. One new case—a scholar.

"May 24. Five new cases—scholars.

"May 25. Five new cases—scholars.

"May 26. Six new cases—scholars.

"May 27. Six new cases—scholars.

"May 28. Two new cases—scholars.

"By this time the whole village was thoroughly infected, and the disease was no longer exclusively confined to school children, but attacked others in the family that already had a case, and in many instances seeming to spring up independently of any connection with any case, and without regard to individual sanitary conditions. * * *

"*Origin.*—It will be remembered that the first twenty-five cases were from among children attending school, and that their homes were in many instances quite widely separated: that as many as twenty-two cases occurred in the short space of ninety-six hours! What, then, must be the conclusion arrived at, even by those whose philosophy does not extend outside the lappet of their purse?

"No one can doubt for a moment that these cases originated from a common source, and nowhere else could a common origin be found but at the school-house or its immediate vicinity; so a most careful examination was instituted, with the following results:

"There was at that time no diphtheria in any of the surrounding towns; there was no case of the kind within the limits of Northumberland; not one of the school children or any resident of the village had been away and returned; so it was not imported: and yet twenty-five scholars were almost simultaneously stricken with this fearful disease. A common origin must be undoubted. Eliminating, then, considerations which might under other circumstances have been factors, I would ask you what remains as a cause? The answer is given in one small word—a word to which should be attached the death emblem of the skull and cross-bones, as a warning to every community, every family, and every individual—the word 'filth.'"

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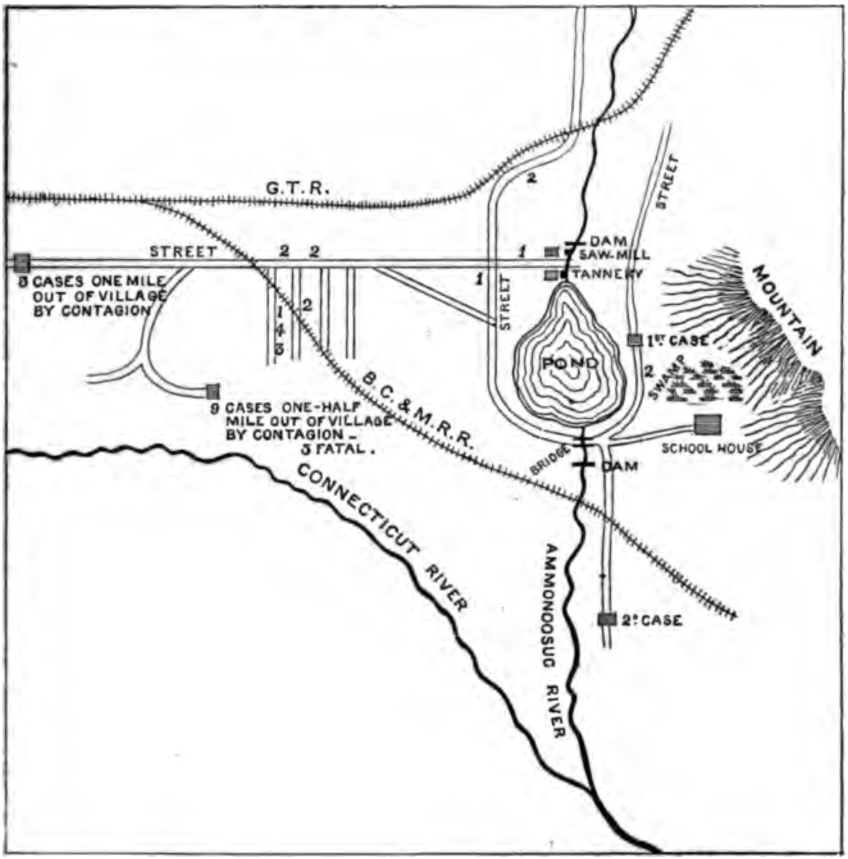
[*] See Transactions of the Vt. S. Medical Society, 1877; also Dr. A. F. Hyde's report on the epidemics of Caledonia County, Transactions of 1866.

NOTE.—The entire record is being reduced and summarized.



Map showing the locality of the epidemic in Groveton (Northumberland), N. H.

WEST BURKE, *July* 10, 1879.

DEAR SIR: I have been waiting for the terminating of the last cases of diphtheria Mrs. Kelley has had a bad time from the toxic effects of the diphtheria. I thought, or rather was fearful, she would die from paralysis, but she is getting along finely. We kept the people and the children from going into the sick-room, and no one has contracted the disease from her. One of the Simpson children went to their uncle's, near East Haven, three weeks ago last Saturday and staid a few hours, and in four days two of the children were taken with diphtheria. One lived five or six days and the other eleven days. The mother and two more children were taken with diphtheria and sent for me. They are all getting better. There are three cases now in East Haven; Dr. Ide is attending them; three have died and he thought one more would die. The people have done something towards disinfecting the Muse Hollow, but have not done what they should. I have said and done all I can to have things thorough with the disinfectants, but know how people after the excitement is over are apt to cease from trying to cleanse their houses. I shall continue to do all in my power to correct unsanitary families in the Hollow. I would like to see you and learn all I could. I hope the diphtheria is arrested. If they are careful in East Haven I think it may stop. There is no other way to do. Mrs. Wilson, of Newark, called on me to-day with a bad throat, effect of former disease.

Parks's children were very sick after you left, but they are well now. I do not think of more cases that have occurred. I should like to call and see you; I thank you for *the instruction* you gave me; I shall always remember you, and my earnest prayer is for your success in arresting the diphtheria and all kindred diseases of like nature. I hope you may live long and be permitted to relieve the suffering part of community. If you come to Vermont, call and see me.

I am truly your friend,

W. W. CARPENTER.

Dr. HARRIS.

EAST BURKE, VT., *July* 12, 1879.

DEAR DOCTOR: Yours came duly to hand. I have delayed answering sooner from the fact there has been a succession of cases in the neighborhood to which you refer. The man whom you mention, Mr. Henderson, brought his child from Newark to his former home, a distance of about eight miles, before it had recovered from diphtheria. This child was visited by a playmate, a little girl, on Friday; on the following Monday I was sent for and found the child to be suffering from a severe attack of diphtheria. The disease ran a rapid course, the child dying within a week. This was an adopted child, one of a family of six belonging to a Mr. Hosford, and lived in the family of a Mr. Henderson (not the one whose child was sick in Newark). During its illness no one saw it except its parents, who lived at a distance of forty rods from the dwelling of Mr. Henderson. The remaining children have all been attacked; two have recovered, two have died, and one is yet sick.

I have seen the teacher of District No. 4, in Newark, who informs me that she noticed nothing until the third day of school, when two of the scholars vomited and complained of headache, and manifested a disinclination to play or study. The next day they were unable to come to school, and by night there were several cases. Those that I have seen have been cases of pure, simple, if I may so use the word, cases of diphtheria uncomplicated by ophthalmia or anything else. There have been some other cases of imported diphtheria very near the village of East Haven, that have been treated by Dr. Carpenter, who will be very glad to give you the particulars. If I can oblige you any further in this matter please command me.

Yours, very truly,

H. C. IDE, M. D.

ELISHA HARRIS, M. D.

P. S.—If there are any details that I have failed to give you that would be of service to you please remind me of them, and I will very gladly give them to you. I might perhaps mention that the sanitary condition of the Hossford's resembled very much some of those you saw in Newark.

H. C. I.

ISLAND POND, *July* 9, 1879.

DEAR SIR: I have learned that diphtheria was carried from Lyndon to Lunenburgh, and that some cases occurred near a lumber mill in Lunenburgh, and that some of the men from the Lunenburgh mill went to Carpenter's in Newark. If this is true it furnishes the missing link in our research. If I get positive evidence I will inform you. I have no doubt the disease was introduced in this manner, and the time is coming when seclusion and disinfection will be practiced as closely as in small-pox. Then we shall have the thing under control. Up to July 3 four cases and three deaths in the "Lost Nation" (East Haven), every one of them traceable to contact with the disease in others.

Yours, truly,

C. G. ADAMS.

Dr. HARRIS.

PRACTICAL SUGGESTIONS.[*]

No other disease in our Northern States has been more generally regarded as unpreventable and none more capricious and fatally obstinate in its mode of prevalence than diphtheria. Its apparently and very probably sporadic origin in numerous instances, its invasion of the most salubrious as well as the most insalubrious quarters, its variable malignancy, and its rapid fatality in numerous cases, wherever it prevails, have furnished ample occasions for the unsettled opinions and sanitary regulations which prevail in regard to this destructive malady. Medical men no longer reject the conclusion which experience has taught concerning the personally contagious attribute of diphtheria ; but as this attribute is variable in its intensity in different cases and on different occasions, apparently, sanitary precautions and regulations adopted to extinguish or wholly control the virus of this disease are only occasionally applied and enforced. Fortunately, the leading physicians of Vermont have correct views upon this subject; but in the scattered population of the State, and with no central board of health, there has been no general diffusion of precise information and sanitary advice in regard to regulations and duties required in the presence of diphtheria in a community.

All the physicians and other educated men I met in Vermont and New Hampshire expressed an earnest desire that a State board of health should be created in each State for the special purpose of accumulating correct and needed information and dif-

Distance and description list, to accompany the map of the district.

	Figure in map.	Distance from School No. 4.
School-house, fourth district	† S.	
School-house in second and ninth, closed	†	
A. F. Carpenter's house	1	Seven-eighths of a mile.
J. Aldrich's house	2	Three-fourths of a mile.
E. Morse's house	3	Two-fifths of a mile.
John Cole's house	4	One-half mile.
F. Simpson's house	5	One-tenth of a mile.
S. Park's house	6	One-eighth of a mile.
J. Gero's house	7	One-half mile.
L. Wilson's house	8	One mile.
D. Fairbanks's house	9	One mile.
Eld. McLucas's house	10	Three-fourths of a mile.
Ephm. Fairbanks's house	11	Three miles.
J. Bill's house	12	One mile.
Mrs. Gray (at Jos. Cole's house)	13	One mile.
O. C. Woodruff's house	14	Two and three-fourth miles.
W. Kelly's house	15	Two and one-fourth miles.

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[1] Several letters and records of experience will be submitted if the National Board of Health deems it expedient when this report is prepared for the press.—H.

Statistical summary of the families and cases.

Families in which diphtheria occurred.	Total number of inmates, all ages.	Inmates under 16 years of age.	Number under 16 years who suffered diphtheria.	Total (of all ages) who suffered diphtheria.	Total deaths.	Notes and references.
Carpenter	8	3	3	5	0	Four in family sick in April; one other was in first series.
Aldrich	8	5	5	8	5	All the children died in first and second series.
E. Morse	9	6	3	3	2	Two died in first series.
J. Cole	5	2	2	5	2	All adults; second series.
Simpson	5	3	3	4	1	Family used the water of the brook.
Park	7	4	4	4	1	Most salubrious homestead.
Gero	10	6	1	1	0	Only one in school, and he alone suffered (the slightest in the list).
Wilson	6	2	2	6	1	All the adults came in second series.
D. Fairbanks	4	2	1	1	0	Children that refused brook-water escaped diphteria.
Lucas	2	0	0	2	0	Of second series.
Bill	8	4	0	1	0	Of second series.
E. Fairbanks	6	3	1	4	2	Second, third, and fourth series; and the latter two fatal.
Gray (Jos. Cole)	4	1	1	1	0	Exposed to infected clothing washed in her apartment.
Woodruff	6	1	0	2	0	See record of this family.
Kelly	4	2	0	1	0	Fourth series; see record.
Total	92	44	26	48	14	

APPENDIX M.

RULES AND REGULATIONS FOR SECURING THE BEST SANITARY CONDITION OF VESSELS, INCLUDING THEIR CARGOES, PASSENGERS, AND CREWS, COMING TO THE UNITED STATES FROM ANY FOREIGN PORT WHERE ANY CONTAGIOUS OR INFECTIOUS DISEASE EXISTS.

[Prepared by the National Board of Health, in accordance with the provisions of an act approved June 2, 1879, entitled "An act to prevent the introduction of infectious or contagious diseases into the United States."]

EXPLANATIONS.

1. The object of the following rules and regulations is to prevent the introduction into the United States of "contagious or infectious diseases."

2. The following diseases are recognized as "contagious or infectious diseases" for the purposes of these rules and regulations, viz: Asiatic cholera, yellow fever, plague, small-pox, and typhus fever.

3. An "infected" port or place in the sense of these rules is a port or place at which either Asiatic cholera, yellow fever, or plague exists, or at which either small-pox or typhus fever exists as an epidemic.

4. To secure the "best sanitary condition" of a vessel the following points should be observed by the owners, agents, or master of such vessel.

A. Exclusion from the vessels, as far as possible, of persons or things known or suspected to be infected.

B. Cleanliness of the ship, both preliminary to loading and during the voyage.

C. Ventilation preliminary to loading, and during the voyage when possible.

D. Disinfection, that is, the destruction or removal of the causes of disease; which includes measures of cleanliness, ventilation, fumigation, &c.

RULES AND REGULATIONS.

1. All merchant ships and vessels sailing from a foreign port where contagious or infectious disease exists, for any port in the United States, must obtain from the consul, vice-consul, or other consular officer of the United States, at the port of departure, or from the medical officer—where such officer has been detailed by the president for that purpose—a bill of health in duplicate, which shall be a clean bill or a foul bill, and which shall set forth the sanitary history of said vessel, and that it has in all respects complied with these rules and regulations. A clean bill of health shall be given when neither Asiatic cholera, yellow fever, nor plague exists, and neither small-pox nor typhus fever exists as an epidemic, at the port of departure, and the condition of the vessel is satisfactory; and in such case it shall be certified that the vessel leaves the port in "*free pratique.*" A foul bill of health shall be given when either Asiatic cholera, yellow fever, or plague exists, and when small-pox or typhus fever exists as an epidemic at the port of departure, or where the sanitary condition of the vessel is unsatisfactory, and in such case it shall be certified that the vessel leaves the port in "quarantine."

2. In all cases of doubt, as to whether the port is infected or as to the sanitary condition of the vessel, the bill shall be foul.

3. No vessel shall have more than one bill of health, but if she touches at other ports on the passage, that fact and the condition of those ports as to the existence of contagious or infectious disease shall be indorsed upon the original bill of health by the consul, vice-consul, consular officer, or medical officer.

4. The bill of health shall be in the form appended. (Form A.)

5. Each consul, vice-consul, consular officer, or medical officer of the United States in a foreign port shall keep himself thoroughly acquainted with the sanitary condition of the port and its vicinity, especially with regard to the existence of contagious or infectious diseases, and shall, upon request of the owner, agent, or master, make, or cause to be made, an inspection of every ship or vessel bound for any port in the United States, and give the certificate or bill of health required by these regulations. Vessels carrying a foreign flag shall be inspected, when practicable, in company with the consul or consular agent of the nation to which the vessel belongs.

6. The fee for such inspection shall be such as may be fixed by the Secretary o Treasury in accordance with law.

7. The certifying officer at the port of departure shall certify whether vessels rying passengers are provided with the means necessary for preserving good tilation and cleanliness, in accordance with sections 4257 and 4263 of the Re Statutes.

8. Every vessel before taking on cargo or passengers shall be clean and dry, an certifying officer may at his discretion require that it shall be thoroughly disinf if last from an *infected* port, or if the port of departure be itself *infected*. The e ination of the vessel as to cleanliness shall be made before the cargo is taken on shall extend to all accessible parts, especial care being taken to note upon the b health the presence of decayed wood.

9. The ballast shall be of such material and from such localities as may be app by the certifying authorities, but earth and porous stone shall not be used for b if avoidable.

10. Merchandise or articles known to be infected shall not be received or take board.

11. In case the port is *infected* the certifying authority may require that the off crew, and passengers shall be examined by a medical officer or physician selecte that purpose, and the result of such examination reported to him not more twenty-four hours before certifying to the bill of health.

12. Bills of health can be considered valid only when delivered within the tw four hours last preceding departure. If the departure is delayed beyond this p the bill must be *viséd* by the authority delivering it, stating whatever changes taken place in the sanitary condition of the port, vessel, officers, crew, or passen

13. When the port of departure or its vicinity is *infected*, that fact shall be not the bill of health, and when the sanitary or other local authority of the port de the existence of such infection the bill of health shall give the date of the de tion.

14. The existence of contagious or infectious disease in the quarantine esta ment of a port shall not be considered cause for a foul bill of health.

15. Physicians attached to sea-going vessels shall be specially charged wit duty of watching their sanitary condition and the health of their officers, crew passengers. On arrival of the vessel they shall report to the health officer of the the sanitary history of the voyage.

16. In case of the occurrence at sea of Asiatic cholera, yellow fever, plague, s pox, or typhus fever, the wearing apparel and bedding used by those affected such disease shall be burnt or sunk.

17. Captains, owners, or agents of vessels shall, at the port of departure, be req to answer, under oath, to the consuls or sanitary officers, all questions as to the tary condition of the vessel, &c.

18. The crew shall not be allowed liberty on shore after nightfall in susp localities. They shall not be allowed to sleep on deck except under awnings. forecastle shall be well ventilated and kept dry. Both in port and at sea the shall be pumped out each morning and evening, or more frequently if neces The utmost cleanliness shall be observed at sea as well as in port. Each se should have two suits of underclothing. The clothing and bedding should be every clear day. In tropical climates the men should be required to wash thei sons and change their underclothing every evening after work while in port, and working-suit should be washed, dried, and aired after a day's use. These regula as to clothing, airing of bedding, and ventilation, should, as far as possible, served at sea as well as in port.

19. Whenever any vessel shall leave an *infected* foreign port, or having on goods or passengers coming from any place or district infected with Asiatic ch yellow fever, or plague, shall leave any foreign port, bound for any port in the U States, the consul, consular officer, or other representative of the United States, near such port, shall immediately give information thereof by telegraph t National Board of Health at Washington, D. C., reporting the name, date of de ure, and port of destination of such vessel. The cost of such telegrams will be by the National Board of Health.

20. All merchant ships or vessels from any foreign port, where any contagio infectious disease exists, and bound for any port of the United States, must pr to the health officer at the quarantine station of such port evidence that these and regulations have been complied with in order that such vessel may enter port, discharge its cargo, and land its passengers.

FORM A.

No. —, Port of ———.

THE UNITED STATES OF AMERICA.

NATIONAL BOARD OF HEALTH.

Bill of health.

I, ——— ——— (consul, or consular agent, or other officer empowered by the law to sign), at the port of ———, do hereby state that the vessel hereinafter named clears from this port under the following circumstances:

Name of vessel, ———.
Nature—(Vessel-of-war, ship, schooner, &c.) ———.
Tonnage, ———.
Guns, ———.
Apartments for passengers, No. ——.
Where last from, ———.
Destination, ———.
Name of captain, ——— ———.
Name of medical officer (if any), ——— ———.
Total number of crew, ———.
Total number of passengers,
  First cabin, ———.
  Second cabin, ———.
  Steerage, ———.
Cargo, ———.
Sanitary history of the vessel:

1. Sanitary condition of vessel (before and after reception of cargo, with note of any decayed wood). Note disinfection of vessel.
2. Sanitary condition of cargo.
3. Sanitary condition of crew.
4. Sanitary condition of passengers.
5. Sanitary condition of clothing, food, water, air-space and ventilation (to be in quantity as required by Revised Statutes).
6. Sanitary condition of port and adjacent country—
   - *a.* Prevailing diseases, if any.
   - *b.* Number of cases of and deaths from yellow fever, Asiatic cholera, plague, small-pox, or typhus fever during the week preceding.
7. Any circumstances affecting the public health existing in the port of departure to be here stated.

Clean. I certify that I have personally inspected the said vessel, and that the above statements are correct; that good health is enjoyed in this port and the adjacent country, without any suspicion of yellow fever, Asiatic cholera, or plague; that neither small-pox nor typhus fever exists as an epidemic; that the sanitary condition of the vessel, cargo, crew, and passengers is good, that the rules and regulations prescribed by the National Board of Health have been complied with, and that the [name of vessel] leaves this port in *free pratique*, bound for ———, United States of America.

Or,

Foul. I certify that I have personally inspected the said vessel, and that the above statements are correct, and that she leaves this port bound for ———, United States of America, in *quarantine*.

In witness whereof, I have hereunto set my hand, and the seal of office, at the port of ———, this —— day of ———, 18—, — o'clock—

[SEAL.] ——— ———

[*Consul-General, Consul, Commercial Agent, Sanitary Officer, et al.*]

The within rules and regulations are true copies, made this 26th day of June, 1879.

J. L. CABELL,
President National Board of Health.

THOS. J. TURNER,
Secretary of National Board of Health.

The foregoing regulations are approved.

R. B. HAYES.

JUNE 26, 1879.

APPENDIX N.

SANITARY REGULATIONS FOR QUARANTINE STATIONS, VESSELS, RAILROADS, &c.

Circular to State and municipal health authorities.

The National Board of Health is charged with the important duty of co-operating with and aiding State and municipal boards of health in the execution and enforcement of the rules and regulations of such boards to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, and into one State from another.

One of the first things to be done to secure efficient co-operation is that the several State and municipal boards of health shall make their rules and regulations *uniform* as far as possible; and to avoid delay in obtaining this extremely desirable end, the National Board of Health suggests the following rules and regulations for adoption by State and municipal boards.

Inasmuch as the immediate danger is from yellow fever, these rules have reference to that disease only.

They are divided into five sections:

1st. Rules and regulations to be adopted and observed at all ports in the United States which are or may be designated as quarantine stations.

2d. Rules and regulations to be adopted and observed for securing the best sanitary condition of steamboats and other vessels, including their cargoes, passengers, and crews, going from any port of the United States where yellow fever exists to any other port or ports in the United States.

3d. Rules and regulations recommended to be adopted and observed for securing the best sanitary conditions of railroads, including their station-houses and road-beds, and their cars of all descriptions, freights, passengers, and employés coming from any point where yellow fever exists.

4th. Rules and regulations to be observed and enforced by the health authorities of a place free from infection having communication with a place *dangerously infected* with yellow fever.

5th. Rules and regulations recommended to be adopted and observed when yellow fever is reported or suspected to exist in any town or place in the United States.

EXPLANATIONS.

1st. Dangerous infection of localities and communities does not necessarily ensue from the introduction of a case of yellow fever.

2d. When such dangerous infection does occur, it is usually not until after an interval of several days from the occurrence of the first case, and during this period, if proper rules be observed, in most instances persons may leave the infected place without the slightest danger of infecting places or communities to which they may go or through which they may pass.

3d. Upon the distinct recognition of this interval, and upon making a proper use of it, depends the possibility of limiting the spread of the disease in the infected locality; of preserving communications between such locality and other communities without danger to such other communities; and of preventing much of the suffering which usually attends an epidemic.

It is because the first cases are either not recognized or not reported that the disease seems to become epidemic almost at once.

Rules and regulations recommended to be adopted and observed at all ports in the United States which are or may be designated as quarantine stations.

EXPLANATIONS.

1. The object of the following rules and regulations is to prevent the introduction into and the spread within the United States of "contagious or other infectious diseases."

2. The following diseases are recognized as "contagious or infections diseases" for the purposes of these rules and regulations, viz: cholera, yellow fever, plague, small-pox, and typhus fever.

3. An *infected* port or place, in the sense of these rules, is a port or place at which either cholera, yellow fever, or plague exists, or at which either small-pox or typhus fever exists as an epidemic.

4. The word "quarantine" is used to mean the adminstration employed to determine the presence or absence of the causes of contagious or infectious diseases in vessels arriving at a port, and the securing, if present, the removal or destruction of such causes, and does not imply detention for any specified time, nor for more time than is necessary for the above purpose.

1. The quarantine station shall include, 1st, a location for the boarding and detention of vessels; 2d, quarters for the detention of passengers not sick; 3d, hospital accommodations for the sick; 4th, lighters, wharves, and warehouses for receiving and storing cargo; 5th, a chief medical officer and such other officers or agents as may be necessary for securing the examination, cleansing, and disinfection of the vessel and its cargo, passengers, and crew; 6th, boats, apparatus, &c., necessary for administration; 7th, quarters for officers and men; 8th, burial-ground.

2. The quarantine shall be at a point sufficiently remote from the centers of population to secure immunity from diseases likely to be communicated; where vessels may safely remain at anchorage; where hospitals, quarters for passengers, and warehouses can be conveniently located, and where the sanitary condition is favorable.

3. The quarters for detention of passengers not sick shall be at such point within the quarantine limits as to secure, so far as possible, isolation from the accommodations for the sick or other sources of infection.

4. Separate hospitals shall be provided for—
   (*a*) diseases not infectious or contagious;
   (*b*) yellow fever;
   (*c*) other infectious or contagious diseases.

5. Every vessel arriving from the foreign port shall immediately proceed to the boarding station, and shall be visited by the quarantine officer between sunrise and sunset as soon as possible after such arrival. Such officer shall examine the bill of health, and shall inspect the ship, and require of the captain or master answers, in duplicate, under oath, to the following questions: [For this purpose the quarantine officer should be authorized to administer oaths.]

City and port of ———.
Quarantine questions put to the master of ———.
——— (name of vessel).
——— — (date).

1. From whence is the vessel you command?
2. How many days have you been on the passage?
3. Have you touched anywhere?
4. If so, where?
5. At what date?
6. For how long?
7. Did you take in cargo or passengers there?
8. Have you any bills of health? If so, produce them.
9. Have you communicated with any vessels in the course of your cruise or passage?
10. If so, at what date?
11. Name of vessel?
12. From what ports were they?
13. Was any sickness existing on such vessels?
14. If so, what?
15. During the course of your cruise or passage what cases of disease have occurred on board?
16. At what dates?
17. Has any death taken place on board your vessel since you left the last port?
18. If so, at what date, and from what cause, to the best of your knowledge?
19. Has yellow fever ever existed on the ship? If so, when?
20. What is the number of officers, crew, and passengers?
21. Are the officers and crew the same as when you started?
22. How many passengers in—
    First cabin?
    Second cabin?
    Steerage?
23. Have you any reason to think that yellow fever, cholera, or plague existed in the vicinity of the port from whence you sailed, or near any others at which you have touched, or any vessel with which you have communicated during the present cruise or voyage?
24. What is your cargo?

25. What is your ballast and from where obtained?
26. To whom consigned?
27. What is the present sanitary condition of the vessel, cargo, crew, and passengers, to the best of your knowledge and belief?
28. Have you a medical officer? Give his name and produce his report.

——— ———.
[Signature of master or captain.]

Sworn and subscribed to before me, an officer empowered to administer oaths, etc.
[L. S.]

——— ———.
(*Official title.*)

QUARANTINE STATION,
——— ———,
——— ———, 18—.

This vessel has permission to proceed [or is detained for observation].

——— ———,
Health Officer.

[Duplicates.]

[Here insert local regulations.]

6. In case the condition of the vessel is satisfactory, and neither yellow fever, cholera, nor plague (nor small-pox or typhus fever in epidemic form) existed at the port from which she sailed, or at any intermediate port at which she may have touched, or on any vessel with which she has come in contact during the voyage, the health officer may give free pratique, and the vessel may proceed to the wharf or usual anchorage,

7. In case yellow fever, cholera, or plague existed, or small-pox or typhus fever prevailed in epidemic form, at the port from which she sailed, or at any port at which she has touched during the voyage, or on any vessel with which she has come in contact during the voyage, she shall be subject to the following rules and regulations:

a.—The time of detention and mode of procedure for a vessel arriving from a port infected or suspected of being infected shall be determined by the local authorities according to the climate and season, but in case of suspected infection by yellow fever the detention shall not be less than sufficient to complete the full period of five days from the date of last exposure to such infection.

b.—The crew and passengers shall be inspected by the health officer, and if any are sick they shall be removed to the proper hospital.

c.—Passengers not sick shall be removed to quarters prepared for their reception.

d.—The clothing of the sick shall be disinfected at the quarantine station. The baggage shall also be disinfected, preferably by dry heat.

e.—The hatches shall be opened, and the vessel, as far as possible, aired, the bilges pumped out, and the cargo immediately discharged upon lighters, or transferred to the warehouses specially prepared for its reception.

f.—After the discharge of cargo the vessel shall be thoroughly cleansed, disinfected, and ventilated; the hold, the forecastle or sleeping apartments of the crew, and the cabins for passengers, as well as bunks and portable berths, shall be treated in like manner. All decaying wood shall be scraped and disinfected with strong solutions of the sulphates or chlorides of iron or zinc. The ballast, if of earth, sand, or porous stone, shall be dumped where it cannot be exposed at low water.

g.—Until this process of discharge of cargo and purification has been completed to the satisfaction of the quarantine officer, as shown by his certificate to that effect, there shall be no communication between the vessel and the shore, or other vessels, except by the written permit of the quarantine officer, and then only in the manner and for the purpose specified in said permit.

8. The sick shall be detained in hospital until recovery, and for such a time afterward as will insure that they will not communicate or transport the causes of disease.

9. Passengers under observation for yellow fever shall be detained for at least five days from the time of the last exposure. In case of other contagious or infectious diseases they shall be detained until, in the judgment of the quarantine officer, they may be safely permitted to go on shore. In case of small-pox occurring on board a ship arriving at any port, the sick shall be sent to hospital, and all not sick shall be immediately vaccinated or revaccinated. The ship shall be returned to service after the thorough cleansing and disinfection above required, but only upon the certificate of the quarantine officer. Passengers shall be detained no longer than the period of incubation of the disease or diseases for which the ship is quarantined. In case, how-

ever, that yellow fever, cholera, plague, small-pox, or typhus fever occur among the passengers so detained, the quarantine officer shall send the person or persons affected with such disease to hospital, and the other passengers shall be detained until he shall be satisfied of their freedom from infection.

10. Persons employed at quarantine stations, who have been brought in contact with infected vessels, shall not be permitted to leave such station until their clothing has been washed and disinfected, nor until after an interval of five days since their last exposure to infection.

11. It shall be the duty of the quarantine officer to take the responsibility of applying such additional measures as he may deem indispensable for the protection of the public health.

12. These rules and regulations shall apply to all vessels arriving from an *infected* port of the United States at any other port of the United States; but in such case a certificate of health, of the form appended, shall be required:

I hereby certify that I have personally examined the vessel named herein, and find that the sanitary condition of the vessel, cargo, crew, and passengers is ———; that ——— [number of] passengers, officers, or crew have fever; and that the rules and regulations prescribed by the National Board of Health have ——— been complied with.

——— ———,
Quarantine Officer.

Rules and regulations recommended to be adopted and observed for securing the best sanitary condition of steamboats and other vessels, including their cargoes, passengers, and crews, going from any port of the United States where yellow fever exists to any other port or ports in the United States.

EXPLANATIONS AND GENERAL RULES AND REGULATIONS.

1. The object of the following rules and regulations is to prevent the spread within the United States of contagious or infectious diseases.

2. For the purposes of accomplishing this result the following points should, in all cases, be attended to:
   - A. Exclusion, as far as possible, from the steamboat or vessel, of persons or things known or suspected to be infected.
   - B. Cleanliness of the steamboat or vessel, both preliminary to loading and during the voyage.
   - C. Ventilation in port and during the voyage as far as practicable.

3. It is recommended that these rules and regulations be adopted and enforced by State and local boards of health.

4. Every captain or commanding officer shall keep in a book or permanent record the sanitary history of the steamboat or vessel under his charge.

5. The captain or commanding officer shall enter upon his record daily all facts relating to the health of the passengers and crew, and the amount and kind of sanitary cleansing during the passage.

6. A port or place shall be considered *infected* when yellow fever exists there, or in its vicinity.

7. A port or place shall be considered *dangerously infected* when so declared by the National Board of Health.

Rules and regulations to be observed at the port or place of departure when yellow fever exists there or in the vicinity.

1. When a port or place is infected, a sanitary inspector or health officer shall be appointed or detailed to enforce the rules and regulations relating to vessels engaged in domestic commerce or intercourse, to make a thorough inspection of every steamboat or vessel bound for any port of the United States, and to give the certificates required by these regulations.

2. All steamboats and vessels sailing from an infected port or place must obtain from the sanitary inspector or health officer, appointed or detailed for that purpose, a certificate of health, such certificates being necessary to obtain permission to land cargo or passengers at other ports.

3. The said health officer shall obtain full and satisfactory information respecting the various points set forth in the blank forms for certificates of health hereto appended, and shall fill out these blanks in duplicate; a blank of Form 1 shall be given to the master of the steamboat or vessel to serve as his bill of health, and constitute a part of the record he is herein required to keep; one of Form 2 shall be given to each passenger. The duplicates of these forms shall constitute a part of the report of the health officer. For the purpose of being qualified to perform these duties, he should have power to administer oaths.

4. Every steamboat, or vessel, before taking on cargo or passengers shall be clean and dry, and, if last from an infected port or place, or if the port or place of departure be declared *dangerously infected*, thoroughly disinfected. The examination of the vessel as to cleanliness shall extend to all accessible parts, and especial care shall be taken to note the presence of decaying wood.

5. The ballast shall be of such material and from such localities as may be approved by the certifying authorities, but earth and porous stone shall not be used for ballast if avoidable.

6. In no case shall the cargo be taken on until this inspection has been made, and the hygienic condition of the vessel has been found satisfactory. In case of violation of this rule, the inspector may order the discharge of the cargo until it has been complied with.

7. After the cargo has been taken on, a second inspection shall be made when in the opinion of the certifying officer there is any doubt as to the hygienic condition of the vessel, passengers, cargo, or crew.

8. Whenever a steamboat or other vessel is known or suspected to be infected, it shall proceed to the nearest quarantine station, or to some isolated location, there to be cleansed and disinfected.

9. In the event that no quarantine station or suitable location is near at hand, or should the master or captain of the vessel refuse to submit to these rules and regulations, or avoid compliance with them, the inspecting officer shall telegraph to the health authorities of the ports at which the boat or vessel may touch, who shall order her to be detained, cleansed, and disinfected.

10. Goods or articles known or suspected to be infected shall not be received as cargo.

11. The crew shall be carefully examined by the health officer, and no one having fever shall be suffered to remain on board.

12. Careful inquiry shall be made as to the history of the crew for the previous five days, and if it shall be found that any one has been affected with or has been exposed to infection of yellow fever, or has brought articles suspected of being infected, such member of the crew and such articles shall be removed from the vessel, the suspected articles disinfected, and the person kept under observation for a period not less than five days.

13. The attention of the captain or master shall be directed to the personal cleanliness of the crew, their food and drinking water. If any of them fall sick, their immediate removal to a hospital is important.

14. None of the crew shall be permitted to sleep on deck at night; and this shall be guarded against especially while the boat is touching at malarious or sickly places.

15. If, from the situation of the vessel, immediate removal is impossible, the sick shall be kept separate from the well, and medical attention secured as early as possible.

16. These rules shall relate to passengers, so far as applicable.

17. The health officer shall certify on the bill of health the precautions that have been taken, and the danger to be apprehended from cargo, passengers, and crew.

18. The foregoing rules and regulations shall also apply to tugs, tows, barges, and canal-boats.

19. When the National Board of Health declares a port or place to be *dangerously infected*, steamboats or vessels shall be required to be disinfected within twelve hours before departure, and also to transfer cargo and passengers at a point to be indicated in the special instructions issued to meet emergencies.

20. Steamboats and vessels which have certificates showing that they have complied with these rules and regulations shall not be detained by other health authorities unless for sufficient cause.

21. Physicians attached to steamboats or other vessels herein referred to shall be considered as their health officers, and shall be specially charged with the duty of watching their sanitary condition, and the health of their crew and passengers.

FORM 1.

No.—, Port of——.

UNITED STATES OF AMERICA.

NATIONAL BOARD OF HEALTH.

Bill of health.

I, ——— ———, at the port of ———, do hereby certify that the vessel hereinafter named clears from this port under the following circumstances:

Name of vessel, ———.

Has the name ever been changed; if so, how?

Where built.
When built.
Nature (steamboat, ship, schooner, &c.) ——.
Tonnage, ——.
Apartments for passengers, No. ——.
Destination, ——.
Name of captain, ——.
Name of medical officer (if any), ——.
Total number of crew, ——.
Total number of passengers, First cabin, ——.
Second cabin, ——.
Steerage, ——
Cargo, ——.
Ballast, ——.
Sanitary history of vessel, with statement of number and dates of cases of yellow fever.
If recently near quarantine grounds.
If recently alongside sea-going ship or a harbor tug, give name of ship or tug, and date.
Sanitary condition of every part of the vessel (before and after reception of cargo, with note of any decaying wood).
Sanitary condition of cargo; if reshipped from other vessels, give names and dates.
Sanitary condition of crew.
Sanitary condition of passengers.
Sanitary condition of clothing, food, water, air-space, and ventilation.
Sanitary condition of port and adjacent country:
a. Prevailing diseases, if any.
b. Number of cases of yellow fever during the week preceding.
Any circumstances affecting the public health existing in the port of departure to be here stated.

—— ——.

I certify that I have personally examined the steamboat or vessel named herein and find that the sanitary condition of the vessel, cargo, crew, and passengers is ——, and that —— member of the passengers, officers, or crew have fever; that the rules and regulations prescribed by the National Board of Health have —— complied with, and that the [name of the vessel] leaves this port bound for ——, State of ——.

In witness whereof I have hereunto set my hand and seal, at the port of ——, this —— day of ——, 18—.

[SEAL.]

—— ——.

FORM No. 2.

I hereby certify that I have examined —— ——, passenger on ——, from —— to ——, date ——, and find that he is not now affected with fever; and inasmuch as he (or she) has complied with all the rules and regulations relating to the departure of passengers from towns and places infected with yellow fever, he (or she) is permitted to proceed.

—— ——, M. D.,
Health Officer.

[Indorsement for Form No. 2.]

This certificate will give —— —— liberty to proceed without hinderance to his place of destination.

—— ——,
Officer.

Rules and regulations recommended to be adopted and observed for securing the best sanitary condition of railroads, including station houses, road-beds, their cars of all descriptions, freights, passengers, and employés coming from any point where yellow fever exists.

GENERAL RECOMMENDATIONS.

1. It is recommended that these rules and regulations be adopted and enforced by the State and local boards of health.

2. At all seasons of the year, the depots and surroundings shall be kept clean, the grounds well drained and free from stagnant water and decomposing organic matter; the water-closets and privies shall be kept thoroughly clean in every part, and free from offensive odors; the vaults of privies shall be emptied often enough to prevent

any large accumulation of excrement or offensive matter, and shall be kept disinfected by the use of saturated solutions of the sulphates or chlorides of iron or zinc in sufficient quantity to remove all offensive odors.

3. The road-beds and tracks of railroads shall be kept free from filth and impurities. It is especially enjoined that this rule be observed in respect to all sidings near stations or towns.

4. The upholstered seats of passenger and sleeping cars, and the mattresses, pillows, blankets, curtains, and carpets of sleeping-cars, shall be thoroughly whipped or beaten (in the open air so far as practicable), and brushed free from all dust, and thoroughly aired and sunned at the end of each trip.

5. All railroad-cars should be as well ventilated as possible, at all times.

6. Whenever any city, town, or other place having railroad connections is infected by yellow fever, the following rules should be enforced by State or municipal authorities:

Rules and regulations to be enforced during the existence of yellow fever.

1. Every train leaving an infected city, town, or other place, shall be inspected by a competent medical man, who shall give to the conductor of said train a certificate of the results of his inspection, in accordance with Form No. 1, appended hereto.

2. It shall also be his duty to furnish certificates to each passenger, in accordance with Form No. 2, appended hereto, and no passenger shall be permitted to leave an infected place without such certificate. No person having fever shall be allowed to take passage on such train.

3. All cars leaving such place shall be thoroughly cleansed and fumigated with sulphurous acid gas, by burning 18 ounces of sulphur for every 1,000 cubic feet of space, closing up the car tight for six hours prior to date of leaving.

4. No upholstered car shall be allowed to leave a dangerously infected place.

5. All baggage shall be thoroughly disinfected at the station before leaving.

6. At a point not less than five miles, and as near this distance as possible, from the point of departure from a dangerously infected place, there shall be an entire transfer of passengers and baggage to other cars, which cars shall never enter an infected district.

7. This transfer shall be made in the open air, under the supervision of a medical officer, and as far from a habitation as possible, and no person with fever shall be allowed to proceed, but shall return to the point of departure, or be treated in hospital at or near the place of transfer.

8. The medical officer at the transfer station shall carefully examine the conductor's certificates and the certificate of each passenger, and fill the blanks appended to them to accord with the results of his examination.

9. No sleeping-car shall be allowed to leave a dangerously infected place, nor shall any sleeping-car approach nearer such place than the point of transfer. Any passenger-car leaving such infected place shall be thoroughly ventilated during its passage to the place of transfer, by having the windows of the car open during such passage.

10. In case of suspected infection of a passenger-car, or of a sleeping-car, such car, including all the upholstery, cushions, curtains, mattresses, &c., shall be thoroughly disinfected, under the supervision of a medical officer, and shall be exposed to the open air for at least twenty days before being again used.

11. All freight shall be transferred at a point not exceeding 50 miles from the point of departure, and the cars from which such freight has been transferred shall not proceed further on the road, but shall be returned to the point of departure. The freight-cars, after unloading, shall be thoroughly cleansed by scrubbing, fumigation, disinfection, and ventilation.

12. Mail matter and mail-bags should be heated to a temperature of two hundred and fifty degrees Fahrenheit, or should be otherwise disinfected before they are sent from infected places.

13. At some point not less than 50 miles from the first transfer station a second complete transfer of passengers and baggage is desirable, and should be provided for by the authorities of the States through which the line runs.

14. If yellow fever infect a place situated upon a line of railroad, trains of all kinds may be permitted to pass through without stopping, at a speed of not less than 10 miles an hour, provided the National Board of Health has not declared it dangerous to do so, and published through the local health authorities a special rule forbidding it. But they shall not take on passengers within one mile of such infected place, and all persons taken on shall first obtain the certificate from the local officer set forth herein.

15. No train having a certificate of such inspection, and no passenger having a proper certificate that he was free from disease, and that his baggage, &c., was properly disinfected, shall be interfered with by municipal or other local systems of quarantine.

16. Also persons leaving infected places by other modes of travel than those provided for in these rules and regulations, shall be required to obtain certificates according to blank Form 3, appended hereto.

FORM No. 1.

I hereby certify that train No. ——, which left ———, ———, conductor, has complied with all the rules and regulations of the National Board of Health relating to railroad trains leaving places infected by yellow fever.

Name of city, town, or place ———.

Date ———.

——— ———, *Officer.*

I hereby certify that train No. ——, above referred to, has transferred its passengers and baggage at this transfer station to other cars, and in all other respects complied with the rules and regulations of the National Board of Health, and that it has no case of fever on board, and is therefore permitted to proceed without further detention.

Transfer station on ——— R. R., near ———.

Date ———.

——— ———, *Officer.*

FORM No. 2.

Personal certificate.

I do hereby certify that ——— ——— has complied with all the rules and regulations of the National Board of Health relating to the departure of passengers from towns and places infected with yellow fever, and that he [or she] is now not affected with fever.

Name of place ———.

Date ———.

——— ———, *Officer.*

I do certify that ——— ———, above referred to, has complied with all the requirements and regulations of the National Board of Health relating to transfer of passengers leaving places infected by yellow fever.

Transfer station ———.

Date ———.

——— ———, *Officer.*

FORM No. 3.

Personal certificate.

I hereby certify that ——— ——— has complied with all the rules and regulations of the National Board of Health relating to the departure of passengers from towns and places infected with yellow fever, and that he [or she] is now not affected with fever, and is permitted to leave ——— ——— for ——— ———, by ——— [described mode of travel.]

Name of place ———.

Date ———.

——— ———, *Officer.*

I hereby certify that ——— ———, above referred to, has complied with all the rules and regulations of the National Board of Health relating to transfer of passengers leaving places infected by yellow fever.

Transfer station ———.

Date ———.

——— ———, *Officer.*

Rules and regulations to be observed and enforced by the health authorities of a place free from infection having communication with a place dangerously infected with yellow fever.

1. No steamboat or other vessel, or railroad train or other conveyance, or persons, from a place *dangerously infected*, shall be permitted to enter a non-infected place without having certificates of the forms prescribed (see pages 17 and 26), giving evidence that they have complied with the rules and regulations provided for conveyances and persons leaving *dangerously infected* places.
2. Inspections to ascertain whether these rules have been observed, and whether it is safe for the conveyances or persons to enter a non-infected place, shall be made outside the limits of such a place.
3. Separate accommodations must be provided both for the sick and for the well who are detained for observation.

Rules and regulations recommended to be adopted and observed when yellow fever is reported or suspected to exist in any town or place in the United States.

GENERAL EXPLANATIONS.

A. During the warm season, in all localities in any way exposed to the contagion of yellow fever, the possibility of its occurrence should never be lost sight of by physicians, and when it is known to be present in any place, the antecedents and diagnosis of every case admitting of doubt should receive special attention.

B. Upon an outbreak of yellow fever a competent medical officer should be assigned to the locality as health officer, to enforce the following rules and regulations:

1. All physicians shall report to the health authorities with the least possible delay their knowledge or belief of the existence of the first cases of yellow fever, and shall at the same time secure, as far as possible, the isolation of such cases pending the action of the health authorities.
2. Upon the receipt of such report the health authorities shall at once investigate the case, and if it be found to be yellow fever or a case admitting of reasonable doubt, they shall at once have the patient isolated as effectually and completely as possible.
3. In case of the patient's removal, recovery, or death, the premises occupied by him shall be thoroughly disinfected, and the clothing, bedding, and other articles which have been exposed to infection shall be either burned or boiled in water for not less than thirty minutes.
4. When the health authorities of any place shall first discover a case of yellow fever there, they shall report the fact at once by telegraph to the National Board of Health.
5. An attempt should be made to isolate and keep under observation for at least five days all persons who have been in such relation to the first case or cases as to make it possible that they are infected.
6. In general, no place shall be considered *dangerously infected* until at least one case has occurred as a result of infection incubating within the place itself.
7. When a place is declared *dangerously infected*, the health authorities should advise and use every effort for the removal of all persons liable to yellow fever to a place or places safe from danger of infection. When they can be removed to only a short distance, it is better to locate them in tents in the open air.

APPENDIX O.

REPORTS UPON THE PORTS AND CITIES OF THE NORTH ATLANTIC COAST.

To the National Board of Health:

GENTLEMEN: In this report it is my duty to present to you the chief results of the sanitary inspections and investigations which I have made, as directed by you, with particular reference to quarantine and other sanitary defenses of the ports and cities of the Northern Atlantic coast.

All the statements herewith submitted are based upon personal investigations and facts verified in the course of my duty.

The port and city of New York being taken, as you advised, with so much of the water-side region of New Jersey as seems most important in its sanitary relations to New York, this center of the public health interests of the nation becomes first in the order of our inspections in the district you assigned. The several cities and suburbs that environ this port as a center will be mentioned as pertaining to it and showing in the sanitary problems to which the quarantine and civic sanitation of New York relates.

Proceeding from the port and district of New York, the ports and customs districts of the five New England States which border upon the seaboard are thirty-two in number. The cities and districts that stand first in their relations to public health interests and to any direct concern in matters of quarantine and maritime hygiene have been inspected in the following order:

New York and the cities and suburbs that front upon its harbors and the port, namely: Brooklyn, Long Island City, and Bay Ridge; Staten Island; Perth Amboy, N. J.; Bridgeport and the Fairfield district, Conn.; New Haven, Conn.; New London, Conn.; Providence, R. I., and the refuge harbor of the Newport customs district; Boston, Mass.; Portsmouth, N. H., and Kittery and Portland, Me.

These are the ports of this region of the Atlantic coast which have been most frequently exposed to the presence and sanitary perils of vessels infected with yellow ever, and also, occasionally, to the debarkation of persons from shipboard with malignant cholera. Foreign immigrants are landed at each of these places, and at New York and Boston upwards of 60 per cent. of all the foreign emigrants to the United States arrive; the number arriving in these two ports in the fiscal year 1878 being 115,452, out of the aggregate 199,477 immigrants to our country that year.

In each of the port-districts I have inspected there has been an instructive record of yellow fever and of Asiatic cholera, and so important has been the record of the former malady in each place, that it has seemed dutiful for me briefly and carefully to review it in connection with questions of quarantine and other sanitary measures.

Besides these there are twenty-four other ports or customs districts on the long line of coast, all of which, and each for itself, must ever share in the interest of any general laws and regulations for the protection and improvement of maritime and port hygiene. Several of these minor ports have on numerous occasions extemporized certain rules and regulations in the nature of quarantine for protection against infected vessels and contagious diseases. State laws provide for the exercise of such authority. Whatever we have found instructive and important in this experience of theirs we have summarized and placed under appropriate heads in the classified statements appended to this report.

The parallels of latitude comprised between the southern boundary of the port and bay of New York and the city of Portland, Me., cover a little more than 3°, namely, from 40° 30′ to 43° 38′ north latitude. The latitude of New York, under 41° north, and that of New London and Providence, under 41° 50′ north, certainly permits those conditions of climate which in particular years have been associated with the infection of limited areas with yellow fever, and such infection has occurred in connection with ample proofs of the exotic origin and ship-transportation and planting of it from West Indian sources. Boston and Portsmouth have also had repeated experience of fatally infected but very limited areas contiguous to the places where infected vessels were moored. The past as well as some quite recent experience at Portsmouth and at Kittery, Me., has demonstrated in a most instructive way how the portable virus of yellow fever is transported to places far north, where no malady can be more utterly exotic, and, with no other nurture than heat and moisture and abundant organic matters, propagate itself destructively to persons who had received directly from an infected ship a few infected articles of utility, while with like fatal consequences other persons contracted the fever by a brief visit on shipboard.

Portland, in Maine (north latitude 43° 38′ and west longitude 70° 15′), seems to have resisted the propagation of yellow fever even at the marine hospital station, where the victims of the fever have been repeatedly received with their infected clothing directly from shipboard. In no instance can we ascertain that the infection has been communicated to any one in Portland or at the marine hospital in Deering. The official statement on this point in the appended papers, the lodging-houses and shipping of Portland, when exposed to materials presumably infected and to persons sick with yellow fever, seem to have furnished no instances of the repropagation of the disease.

The facts here mentioned will sufficiently explain the reasons for reporting separately upon the series of ports as herein enumerated, without delaying until the still greater number of ports that are subordinate to these in any sanitary importance could be inspected and reported upon. But in regard to certain specified matters of local experience, which, besides being directly instructive and suggestive in regard to local conditions, are practically important to all of these ports in common. Indeed, this vast experience in Northern ports should help to elucidate most important questions of theory and actual practice in matters of quarantine, both within and beyond the limits wherein the national government may usefully prescribe the regulations by which yellow fever should be pursued as a national foe. Upon this margin of the great field of national sanitary inquiry there is much experience and has been much study, which should now be of practical value to the National Board of Health.

PORT OF NEW YORK.

Comprising the bay and its two northward arms, North and East Rivers, the port and harbor are shared by the six cities, of which New York is the commercial center. These cities and the entire panorama of the port, as viewed from the tower of the United States Signal Service or the new post-office on lower Broadway, constitute a sanitary district which must be regarded in its totality as well as in regard to its six municipalities, its State quarantine system, and the local government of the seven counties and the two States which border upon this port.

The harbor and water-fronts of the port.—From Battery Park, at the southern terminus of New York City, the upper bay or harbor appears as an irregular ellipse, compressed as it passes southward of the head of Staten Island, six miles distant, approaching the Narrows between the headlands of that island and Long Island. The four miles expanse of the bay between New York shore and the northern portion of Bay Ridge, on Long Island, becomes narrowed to less than two miles as the bay is compressed to form the deeper channel between Long and Staten Islands, and, at the Narrows, between seven and eight miles south of the Battery, the channel deepens to 100 feet and more, and the opposite shores are scarcely one mile apart. Onward and seaward to Sandy Hook, a distance of nearly 10 statute miles, marks an outer line of the Lower Bay of New York, 17 miles from the city, and by course of ship-channels more than 18 miles. The Lower Bay, with Coney Island and the headlands of Long and Staten Islands, near the Narrows on the north, the latter island on the west, and Monmouth County shore southward on Jersey side, define this expanse of nearly a hundred square miles of bay and harbor, within which the ships of all nations have found safe anchorage-ground, as well as a safe approach to the Upper Bay and harbor. The facility of maintaining a secure anchorage in this vast open bay was particularly illustrated in the ten years' history of the hospital-ship Falcon, which was held safely by her anchors at her station 5 miles west of Sandy Hook and 5 miles from the other shores. The present anchorage for infected ships is upon an area of a few square miles within from 3 to 6 miles of Sandy Hook southeastward, and a like distance from Staten Island shore northward.

At the extreme southwestward of the Lower Bay the broad opening of Raritan Bay marks a boundary line of quarantine jurisdiction of New York State, as established by joint convention of New York and New Jersey commissioners. That line extends from Keyport, N. J., to Prince's Bay light due north. From Keyport, and other points of Monmouth County shore, to the Narrows, the distance is 13 miles or more, and upwards of 21 miles from New York City.

Staten Island presents a front upon the Upper and Lower Bays, extending 18 miles (around to Newark Bay); the western margin of New York city extends 16 miles from the Upper Bay up the Hudson; the eastern margin of the city extends some 10 miles upon the East River side, and the tidal front along Brooklyn and Long Island City, and the region which invites waterside commerce in other portions of the counties of Kings and Queens along the harbor, may be counted as 20 miles or more, including the shore of Gravesend Bay and the continuous shores as now occupied from Hunter's Point, or Newtown Creek, to the mouth of Flushing Bay. To these 64 miles and upwards of watersides in the State of New York, most directly related to all matters of sanitary interest of the port, because they constitute a portion of it and are subject to commercial uses in connection with the harbor, there are many more miles that at any time may be commanded by the commerce of the port, and they are at present exposed to any peril which the port and city of New York may suffer from neglect of sanitary defenses. The total length of all these lines of water-front of this port, within the limits of New York State, falls little short of 100 miles, and of this distance commerce has already distributed its docks and warehouses along some 30 miles altogether, excluding the various intervals.

The Jersey side front of the harbor of New York is best defined by saying it is the eastern margin of Hudson County, and extending from Bull's Ferry southward, and bearing westward to Bergen Point or Bayonne City, and the mouth of Newark Bay, a distance little less than 14 miles, and already destined to be one of the longest uninterrupted commercial water-fronts of any port in the United States.[1] It is along this new line of commercial front that the products of the continent are pressing their way to the sea.

Public health questions and the existing conditions and necessities which relate to the sanitary interests of the city and port of New York, present and future, are in view as we undertake to present a statement of results of inspection and examinations in each city and district pertaining to the port.

CITY OF NEW YORK.

The narrow tongue of land upon which the city of New York stands has a northward extension on the Hudson of 17 miles, and as the total area is only about 38 square miles, the mean width of the city slightly exceeds two miles. Bisected by Harlem River, a tidal arm which stretches across from the Hudson at Spuyten Duyvil, diagonally south by east 6 miles in its course to the East River at Little Hell Gate, the old city, or Manhattan Island, is separated from the new wards or Westchester District. The latter district has an available water-front for commercial uses about 4 miles in extent, while the old city or southern district has fully 18 miles available for such uses.

The Westchester wards are destined as building grounds for homes, however much the demands of commerce may occupy their few miles of tidal front. The rock foundation of the district greatly diversifies the face of it, and consisting of abruptly upheaved gneiss and schists so broken and sloped as to facilitate drainage of the upland portions, the entire area admits of complete sanitary preparation for dwellings.

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[1] Bay Ridge shore must evidently be the longest, taken in connection with Brooklyn and Long Island City.

The marshy peninsula between the mouths of the Bronx and Harlem Rivers will have to receive separate sanitary treatment, such as the rapid encroachment of commerce and manufactures along the front of that low area will secure for it. Though the greater portion of the entire Westchester district is reported malarial, it is altogether amenable to such drainage and sewerage as will wholly remove the causes of this disrepute. The copy of a contoured map, showing equal elevations above tide, which we append to this report, presents at one view the outline of drainage problems for this district.

The old city, or Manhattan Island, was geologically fitted by nature for its use as one of the chief port cities. The two great channels which, like arms or canals, extend northward from the Bay of New York, embrace this island so closely throughout its entire length, that all the marginal portion of each of these water-ways has been claimed for docks and warehouses, as far channelward as the governmental preservation of the harbor-lines permits. The depth of these channels and of those that continue from them seaward, as well as northward, exceeds the requirements of the largest ships, the narrowest of them exceeding 90 feet, and at certain places exceeding 100 feet in depth. The mean rise of the tides exceeds 6 feet, and the maximum rapidity of their movement is at the rate of —— miles an hour, the movement of the ebb-tides usually exceeding this rate.

Geology and sanitary topography of the city and harbor.—Rudely upheaved masses of gneiss and schists, and some smaller masses of serpentine dolomites, constitute the rock foundation of the city. The river beds on either side are geologically described by a recent master in physical geography as deep cañon-like gorges worn in the rock 200 to 300 feet below the present water-surface, and, he states, "The greatest depth of water in New York Harbor and Hudson River is about 60 feet, but this does not represent the true depth of the channels, since they have been very much silted up and their rock bottoms are probably 200 or 300 feet below the water-surface*. It is this silt and the heavy strata of clay and mud above it that give the secure anchorage in the more than one hundred square miles which vessels may traverse in the Upper and Lower Bays, and the two rivers of the port. The precise nature of the river bed at the west side of the city is shown in a diagram of the borings by the department of docks, annexed to a subsequent page.

The rocky prominences of Hell Gate and the East River Islands, of Governor's Island, Ellis's, Bedloe's, Robbins' Reef, and Staten Island are natural defenses of the ship-channels, which take their course unvexed to the sea. Though these channels seaward extend some twenty miles, they are open for sails and steam alike, and practically, as the geographer expresses the fact, "New York is located directly on the coast, because here the highlands reach to the sea, and their submerged river channels form rock-girt harbors, immediately accessible from the ocean."* The port and city of New York belong to the world's commerce. The sanitary protection of them concerns the entire human family in this view of their relations. Nature has provided all requisite conditions for such protection.

The soil and peculiarities of surface of the city are sufficiently described upon the maps (numbers ———), and a statement of the surface geography, which I submit with this report. The well asserted insalubrity of the filled-in water-fronts southward from Fiftieth street, on the Hudson River side, and from Fortieth street on the East River side, is amply borne out by records of mortality in the regions which have been thus reclaimed from tide-waters. The evidence on this point is presented in a statistical statement in the appendix. The extent of such made land and of the populated portions of it is shown on the map.

The made land—As shown upon the map (the made-ground and disease-map appendix), the old tidal marshes of Manhattan Island were extensive, nearly bisecting from river to river at Canal street at the southern margin of the Harlem flats, besides extending along the Harlem River almost to the Hudson. The original commercial district from the foot of Broad street to Market street, and from the lower end of Greenwich and Washington to Spring street, was reclaimed from the dominion of the tides by the slow process of filling in. Hanover Square faced the open waters of the East River through then Old Slip, where now cross Pearl, Water, Front, and South streets. The latter three streets, as well as West and Washington streets, are constructed upon made ground for nearly two miles upon their respective water-fronts, and further northward the former coves and estuaries—numerous along both river sides—have been reclaimed and built upon, as seen along the Eleventh, Twelfth, and Thirteenth avenues.

The crib-work and other wooden structures of the front.—The cheapest crib-work to retain the rubbish fillings, and the temporary timbers and piles to support the short-lived wharves and bulkheads, as year by year, and successive generations, witnessed the encroachments outward towards the tidal channels, served the purposes of such a transitional destiny. Vast masses of such wood, and the decayed structures to which they pertained, are now deeply covered beneath the miles of pavement of the streets here mentioned. In the more recently reclaimed districts, like those of the eleventh, eighteenth, and twenty-first, and twelfth wards, the crib-work has been resorted to only at the bulkhead front.

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*Geological History of New York Island and Harbor. By Prof. John S. Newberry.

The bulkheads, wharves, and piers, until the most recent times, were constructed to be buried as ruins after a few years' use, when new structures, the same in kind, were pushed further outward into deeper water. Sanitary questions were not raised, and engineering skill had organized no practical plan for a wiser economy and better commercial facilities. The rotting and boggy foundations over which Washington and Fulton Markets stand, and upon which hundreds of thousands of people walk in the most crowded riverside streets, are so unstable as to make street paving and sewerage difficult. Recently the well-paid contractor for making a new sewer along the northern and outer area of Washington Market, for conducting the Barclay street sewerage, abandoned his undertaking, because it required a cóntinuous massing of deeply-driven piles as a foundation for a great distance back from the Hudson River front. This unstable and unwholesome condition of a vast extent of the city water-front is a matter of concern to the public health of the city and to commerce. It will not be satisfactorily remedied until the front itself shall have been defended by a river-wall, as the dock commissioners have proposed, and are beginning to construct, and until that construction has been supplemented by the completion of the system of intercepting and low-level sewerage with distant delivery into deep water and most impetuous ebb tides. This sanitary problem is being solved by works now in progress by the dock commissioners, and as respects the sewerage, by the department of public works. The nature of these improvements is shown in the appended statements: the docks and water-fronts of New York (with charts and diagrams of same title, 1, 2, 3, 4, 5, 6), and the drainage and sewerage of New York (with map and diagrams of same title, 1, 2, 3, 4), and by the disease map which follows these two chapters.

The mud and other strata which overlay the bed-rock of the water-fronts of the city.—The borings at the bulkhead line, from the Battery northward on either front of the city, reach the bed-rock at variable depths of from 35 feet to 200 feet. The results of such borings at three stations on the Hudson River front, namely, at bulkhead line foot of Chambers, Murray, and Vesey streets, are given upon the opposite page, to show precisely what the grounds under the most crowded sections of the commercial waterside are. We are indebted to the department of docks and the kindness of its engineer-in-chief for this abstract of borings, and for the six other charts and diagrams which are appended; also for the following memorandum concerning the annual rate of filling up or shoaling of the slips or spaces of water between the old piers, this shoaling being caused by the silt and sewerage from streets and sewers.

Table of shoaling in slips on North River, from soundings taken and recorded by the department of docks.

Piers.	Time.	Actual fill.	Annual rate
	Year.	*Feet.*	*Feet.*
New 37, north side	1.30	1.80	1.34
New 38, south side	1.08	3.50	3.24
New 38, north side	1.06	2.70	2.55
New 39, south side	1.05	2.40	2.29
New 39, north side	1.04	2.70	2.60
New 42, north side	1.25	3.40	2.72
Between new 42 and 43	1.20	1.50	1.25
New 46, south side	1.60	4.30	2.70
New 46, north side	1.50	5.80	3.90
New 47, north side	.40	.80	2.00
New 47, south side	.40	1.84	4.60

The foregoing figures kindly furnished for this report by the chief engineer of docks, are regarded as showing fairly what is the average rate of deposition of silt, ashes, and mud along the bulkheads where old sewers are discharging their contents. Some of the docks along the East River side show more rapid filling, yet there are certain sections of that front at which the tides sweep past so impetuously as to clear away the sewage and prevent the deposit of silt. The depth of mud and clay at the outer terminus of numerous piers far exceeds these average measurements. For example, at the channel terminus of the pier at West Thirteenth street (see Chart No. 6, docks and water-fronts, appended statements), the borings passed through 175 feet of mud and deposited materials and the solid rock was reached at 196 feet. Deeply as the alluvial and more recently deposited material has filled in the river-bed along the front of the city, the rocky barrier which underlies Manhattan Island, as well as the Westchester wards (recently annexed), is near the surface. The peculiarities of the surface of the city are fully described, in their sanitary relations, in connection with the maps in an appended statement.

The drainage and sewerage of the city.—The natural drainage was such as old glacial beds of distorted strata of transition rock usually must be, faulty because of deeply worn depressions, obstructing rims and impervious bed. Yet, in one way and another, the overflow and springs from the upland found courses to the tide-water.

The purposes for which, in this report, reference need be made to the natural drainage of the city are best answered by the maps and statements which are found appended; and for the special design to show in what respects the artificial or sanitary drainage has become a matter of concern and practical treatment, we may here introduce two illustrative instances that have come under a strictly sanitary and engineering treatment quite recently. For convenience and brevity let the diagrams be viewed here. Number 1 presents, at one view, an area of 658 acres as a single drainage district, in a region of the city most conspicuously known, namely, that at the southeastern corner of the Central Park and extending southeastward to the East River. It was a region of natural ponds and streamlets in deeply worn rock. The streets and avenues had all been graded and superficially sewered at the usual depth. The natural water-courses had been obstructed, and the future sanitary conditions were certain to be unfavorable throughout an area of hundreds of acres. Nearly forty acres of the district that was already laid out in the usual squares, and divided by filled-in streets, which were built up with broken stone-like barriers, paved, lighted, and superficially sewered, were simply ponds *walled in*, and awaiting the demands for such building lots. The lots being in market, and the filling of them with loose material having begun, the saturated areas upon which dwellings were to be erected, sanitary law was enforced under formal orders to drain to the depth of the bed of all original ponds and water-courses. Hundreds of acres of the built-up districts in the city had in past generations been filled in with loose materials, and the sodden made-grounds covered with dwellings. Such regions are to this day suffering evil consequences from such obstruction and neglect of drainage. The area shown in the diagram upon the opposite page was subjected to deep drainage, as a sanitary measure, under health department instructions, and the faithful supervision of the chief engineer of sewers and drainage, who has kindly prepared the diagrams (Nos. 1 and 2) for this report.

The outfall of the deep main drain and sewer at Forty-ninth street, East River, conducts the enormous flow through it into deep swift tides where it disappears without giving offense or sign of its presence. The deep drainage of the ponds and basins in the higher portions of this extensive area is conducted by culverted conduits beneath the street sewers and deeply beneath the dwelling-houses to enter the main deep sewer, the course of which toward its outfall is shown in the diagram (No. 1) by a heavy black line following near the primitive water-course by which the natural overflow from the region found way to the river.

In Diagram No. 2 is shown the treatment of a well-known region of the city extending from Union Square and Fifteenth street, Fourth avenue, the Bowery, Houston, and Spring streets to the Hudson River. The sewerage of this drainage district extending over 458 acres, which are densely populated, is intercepted and collected by a marginal sewer along the western border of the district, and conducted to the distant terminus of a long pier of the new dock system, the temporary structure for that outfall being a conduit built into the pier immediately under its floor, and descending to a mouth at mean low-tide level. By this means the discharge of sewage is rendered comparatively secure and innocuous, while a long space of crowded water front is saved from what has been for many years past an intolerable nuisance. The drainage of this sewerage district might originally have been treated in some similar way by main outfalls and tributary drains, and a method of unobstructed delivery into tide-water. It is a region that had numerous swampy areas, which have remained undrained except by the superficial sewer-channels. Now being compactly built upon those saturated grounds remain insalubrious, with damp cellars, damp houses, and a conspicuous marking of the mortality-map, not only in epidemic seasons, but at all seasons. (See Disease-Map of New York, Appended Statements.) The eastern and higher portion of that sewer district is and ever has been remarkably salubrious, and for the past century has been touched but slightly by epidemics, and the death-rate ranges from 17 to 21 per 1,000 annually.

Further illustrations of sanitary facts relating to the Hudson River front of the city, and particularly in regard to the structural aid which the department of docks is giving to facilitate the discharge of sewage into deep water, will be found in charts pertaining to the appended statement relating to docks and water fronts of New York. (Diagrams 2, 3, and 4.)

The sewage of the city is destined for the present and a long future to be cast into the tidal floods that sweep either side of this city. The insular position and complete adaptation of the greater portion of the area turns all the sewerage outflow seaward, and unlike the sewers of Paris these of New York must convey with the sewage matters all the outflow of the rainfalls and the total amount of the used water supplies, which altogether is upward of an average of 100 gallons per diem for each inhabitant. The chief question is how shall this outflow be most securely conducted directly into the deep channels where it shall be borne seaward by the ebb tides. The essential conditions for securing this result, and indeed for conducting the sewage down to the water front, were until recently neglected in the plans and construction of the sewers themselves; that is to say, the sewers were built piece by piece, one becoming tributary to another without adequate engineering and adaptation. All this is now to be superseded by the plans which the department of public works has placed on a basis of correct engineering.

The engineer in charge of sewers states that, within the limits of the twenty-two wards of the city, south of Harlem River, there are 375 miles of sewers. He describes them as follows: 205 miles pertain to the old system, and 165 miles are embraced in the new system. Of the former, many miles are sewers only in name, having been laid down before the introduction of Croton water, most of them being simple drains, open at the bottom, while the sides were built of dry stone without mortar or cement, and were made for the purpose merely of conveying the water from the houses which at that time was derived from wells and cisterns. After the water supply was introduced these drains were suffered to be used as sewers, to the great injury of health; and from that time to the date of the sewerage act in 1865, the Croton aqueduct department simply added to and extended, as ordered by the common council, and they were built upon haphazard plans, as called for by individuals, from time to time, not a few being built by the individual property-owners to suit their own views and conveniences.

The new plan.—Under the sewerage law of 1865 plans for the sewerage south of One Hundred and Fifty-fifth street were made and filed by the late Croton aqueduct department, based upon a system of pipe sewers. A system of pipe sewers has many advantages over one of brick, being cheaper, less liable to become obstructed, besides requiring little or no cleaning. It has, however, been found that the larger sizes of pipe sewers are liable to break, either from some defect in the manufacture, or careless laying through improperly made streets.

Previous to 1870, the building of sewers and the grading of streets were in charge of separate departments. The filling of streets and building of sewers were carried forward without providing for the drainage of the land, or of preserving the flow of the natural water-courses, by properly constructed culverts through them, and sewers were laid through the newly-filled streets, and sometimes on a foundation of loose filling, before the street was graded, to save expenses of excavating. These sewers were often several feet above the original surface of the ground; the loose filling would be sure to settle and carry the sewer with it, saturating the ground and rendering it unfit to live upon.

In the original filed plans, the subsoil drainage was entirely overlooked, the neglect of which was rapidly rendering whole neighborhoods unfit to live in, and the revision of these plans became an absolute necessity, so as to place the sewers at such a depth as to intercept the original water-courses, the benefit of which has been very great to the health of the whole city, and of twofold advantage as it serves both to drain the land and flush the sewers.

The original filed plans will be carried out where the sewerage of any district is so far completed as to make any change unwise, and the pipe system will be continued, strengthened, however, by a brick or concrete arch, thus making a very strong and perfect sewer. The main sewers into which the flow of branch sewers is concentrated, very seldom, if ever require cleaning, and the circular shape has proved to be the best form, as combining the greatest strength with the smallest amount of brick work, together with the least cost. In the main collecting sewers, where the grade does not admit of sufficient earth covering over the sewer to lay the pavement, the full circular sewer is flattened and given an oblate form. In all the branch sewers, the egg shape, with the narrow part downward, is preferable as being most suitable for dry and wet weather; in dry weather the flow of sewage being small, the greatest velocity and scouring power is obtained in this section, by narrowing and proportionately deepening the current at the time it is most required, and the broader section at the upper part affords room for the passage of storm-water, as well as for cleaning and examination. The new bulkhead or iron wall along the Hudson River is so far progressed that the main collecting sewer will have its outfall through the new pier at the foot of Clarkson street, discharging at its extreme end directly into the rapid tideway. It will intercept all the sewers between Canal and Fifteenth streets, now discharging into the slips between Spring and West Eleventh streets, comprising an area of 641 acres.

All the great European steamship companies occupy piers along this front, and it is particularly desirable that the water in the adjoining slips be kept as free from impurities as possible, and this can only be accomplished by discharging the sewage at the pier heads into the tide-way as proposed. The collecting sewer, when built throughout the length of West street, intercepting all sewers from the Battery to

West Eleventh street, with only three outlets, viz: At Clarkson, Canal, and Vesey streets, all discharging into the rapid current of the North River, will greatly improve the sanitary condition of the water-front and greatly lessen the cost of dredging.

Underground drains.—By singular and unfortunate oversight in the plans for the sewerage of the city from the beginning until within a comparatively recent period, the subject of subsoil drainage has been entirely ignored, and the consequences have been deplorable. A very large area of the older portions of the city has been suffered to become and to remain completely saturated with water from the old water-courses, to the great depreciation of property and a general detriment to the public health, and even on the adoption of the new system, which was intended to remedy the old, this important subject was neglected. This matter became still more complicated in the regulating and grading of streets. Where they crossed deep ravines of former water-courses, either an insufficient culvert or none at all was constructed in the bed of these streams, and consequently the embankments which form the new street became in every instance a drain behind which surface water accumulated in large quantities. In this way a very large aggregate of land became permanently wet, and the dwellings erected thereon were soon found by the medical profession to be the *locale* of fatal epidemic diseases of a malignant type.

In 1869, under proceedings instituted by the board of health, the deep drainage through the bed courses of original streams having proved the practicability of such sanitary work as we have shown upon Diagram No. 1, a law was enacted in 1871 to enable the public works department, on requisition of the health department, to construct stone culverts for drains in the beds of the old water-courses. The engineer of sewers now states that, "Under this law some 14 miles of drains have been laid, and many hundred acres of land that were formerly saturated with water, and rendered absolutely unfit for occupation, have become permanently freed from moisture, not only improving the value of this property by a very large percentage, but increasing the saulbrity of the entire district drained, as well as benefiting to a very large degree the general health of the city, inasmuch as the malaria which originated in the undrained districts spread itself over a wide area that, so far as soil was concerned, ought to have been free from it. In the construction of these drains the fact soon became evident to me that, unless some change was made in the plans that had been adopted for the sewerage of those portions of the city affected by the old waterways, an enormous expense would be involved in the thorough drainage of these lands by the methods that had been adopted, while in some cases it was doubtful whether those methods could be made successful at any cost. It became necessary, therefore, to adapt the sewer plans to the drainage requirements, or at least to so modify them that the sewers could be used as auxiliaries to the drains, and *vice versa*, by placing them at sufficient depth to intercept the subsoil drainage at certain points, and were laid with porous tile inverts, which became in fact a continuation of the drainage system and brought the two systems into perfect harmony. The result has been entirely satisfactory, and so successfully have these low lands been drained, that I have the fullest confidence in being able, by the reconstruction of the old sewers, to accomplish the same result in the older sections of the city, that have long been given over by the medical profession as the permanent and unavoidable home of malaria." The 13.91 miles of these deep underground drains that have already been constructed have already proved the correctness of the sanitary propositions and predictions which induced this important undertaking. Fortunately the new (Westchester) district of the city presents an open field for the complete demonstration of the utility and economy of such a primary system of deep drainage. A single illustration of the subjugation of one of the largest and most difficult of the natural streams and tidal estuaries of the new district, in this problem of open drainage and subsequent sewerage construction, is given in the statements and charts hereto appended, entitled Drainage and Sewers of the New York Harbor Fronts. By means of a vast conduit for an estuary and old creek that produced extensive malarial swamps and caused pernicious maladies and a death-rate 100 per cent. greater than any normal mortality, an extensive region of the southern portion of that district has been reclaimed from evils that would have been perpetual had the old water-course been neglected and obstructed. For a distance of a mile from its tidal mouth below low water that vast culvert is a *cloaca maxima*, measuring 16 by 10 feet.

Various descriptions of special reforms and evils in the sewers of the cities of New York Harbor are given by diagrams, duly marked, in the appended statements.

I have examined every important sewer outfall in each city inspected in the Northern Atlantic district, visiting them at low tide, studying the construction and plan adopted in each place, and examining into the sanitary questions involved in the several systems, and especially in the defects and neglect of sewers and drainage.

THE INFECTED DISTRICTS OF NEW YORK DURING THE HUNDRED YEARS THAT YELLOW FEVER OCCASIONALLY PREVAILED IN THIS CITY.

There is ample proof that yellow fever prevailed to some extent in this city in twenty out of the one hundred years from 1723 to 1822, inclusive. The center and limits of the area infected are in no instance clearly defined in the accounts that were published in those times until 1791, when upward of 200 persons died, and a record was made concerning an infected district lying between Pearl street and the East River and extending as far north as the present Franklin Square, opposite the Messrs. Harper, publishers. For more than fifty years prior to that period the "malignant fever" from Barbadoes, Saint Thomas, and Havana had prevailed destructively along the commercial water-side, then chiefly limited by Broad street on the southwest and Peck Slip or Fulton street on the north. Even as early as 1702 the "malignant fever" from Saint Thomas extended over the principal portion of the city, and before the 10th of October had destroyed upwards of one-twelfth of the population. The colonial assembly was driven out of the city to continue its session at Jamaica, L. I.

In 1794 the fever obtained a new center and prevailed fatally in the vicinity of New Slip and James street, in the Fourth ward; and in 1795 the infected district had its chief center in Peck Slip, and did fatal execution westward and southward of that point, creating alarm and distributing the disease to certain remote towns on Long Island. Dr. Treal, the health officer, was attacked by the fever while on the duty of boarding the West Indian vessels.

In 1796 there were upwards of 30 cases of the fever between Whitehall and Roosevelt streets, but the infected region was conspicuously centralized near the foot of Broad street.

In 1797 the infected district had its centers in the vicinity of Fly Market, near the foot of Maiden Lane, and at the foot of Market street (then East George street). The districts were well defined.

In 1798 the extreme and long-continued heat and a defective administration of quarantine duties prepared the way for the unprecedented ravages of the fever, which destroyed upwards of 2,000 lives in the city. The ship Fame, at the foot of James street, was accused of causing fifteen deaths in the course of two weeks, and to these may be added the two deaths resulting from exposure of the two men who boarded the ship in the harbor and rode up to the wharf upon her. Her ballast was cast ashore at James street, and on her being moored near the foot of Wall street the infection took a new departure, and from that and other causes of like nature the entire water-side from the lower part of Greenwich and Whitehall streets around to Market street, and even to Pike and Birmingham streets, was ravaged by the fever. There was a separate center—a "house epidemic" of the fever in Barclay street, just west of the present Astor House, but this was traced to a package of clothing from an infected ship. It was limited to the boarding-house in which it originated. The disease was freely transported from New York as a focus of infection in 1798, and it created a "house epidemic" in the purest rural retreat as certainly and fatally as though the infection were freshly from its West Indian habitats.

It is noticeable that it was in that year the ports of New Haven, Bristol, and Portsmouth, N. H., were fatally scouraged by the fever; while it was in 1797 the cities of Philadelphia, Baltimore, Charleston, New London, and Providence suffered most severely.

In 1799 there were scarcely 100 deaths from yellow fever. The inhabitants removed from the infected districts.

In 1800 it prevailed again along Pearl and other streets, in what is now the Fourth ward.

In 1801 it again appeared at various points between the foot of Wall street, along Front, Water, Hamilton, and the lower part of Rutgers streets.

In 1803 it appeared during the last weeks in July at Coffee House Slip, and became widely diffused, and the ablest physicians in the city believed that the fever sprang up *de novo*, or from infection that had not been destroyed during the winter. The records of Bellevue Hospital show that the 186 patients which were admitted with the fever were brought from fifty-seven streets. But the infected district was at first chiefly within the present Third ward. There were 1,639 cases and 606 deaths besides the deaths at quarantine.

In 1804 the fever appeared at a ship-yard by the Wallabout, opposite Corlears' Hook, but it caused no damage in New York and but little in Brooklyn.

In 1805 it appeared in an alley leading out of Maiden Lane, soon after it appeared in Water street, and in September it prevailed in Greenwich and Washington streets. Forty-three cases occurred in the State prison on Greenwich near Christopher street, then in the suburban region on the northern confines of the city. The removal of nearly all the families and business from the infected regions prevented the waste of life that was so alarming in 1803. There were only 600 cases and 262 deaths. Hon. De Witt Clinton, then mayor, in his official announcement of the cessation of the epidemic, November 13, said: "To the voluntary removal of the healthy from the infected parts of the city, the board of health, in a great degree, ascribed the comparative fewness of deaths which have occurred. Whether the disease was communicated by the principle of contagion, or by the influence of an impure atmosphere, the danger was equally alarming, and it was equally expedient to withdraw from it." The theory of personal contagion was at that period losing its adherents, but the advocates of the theory of indigenous origin of the fever in New York and northern ports were confounded, while those who held to that of the repropagation of the imported fever virus by agencies independent of the sick or the dead firmly established their position by the experience of the previous ten years.

In 1806 several cases occurred; also in 1807. And in 1809, while this city remained free, the little village of Brooklyn suffered nearly 40 deaths from it, and 20 residents of the city of New York, who were exposed in the infected district of Brooklyn, were also attacked by the disease, which was traced very clearly to the ship Concordia. And in 1811, the city and port of New York quarantined against Perth Amboy, where several cases and five deaths occurred from yellow fever, introduced by the ship Favorite and the bark Ocean from Havana.

In 1819 the vicinity of Old Slip and William street became infected. Thirty-five cases occurred in the dilapidated building known as "Rotten Row," between Front and Water streets. The wooden facings and bulkheads of Old Slip were in a dilapidated and rotten condition. Eighty-three persons were sent by the city government to Fort Richmond (now Fort Wadsworth, on Staten Island); 10 of these persons sickened with fever, and 3 died. The infected district is described as bounded by East River, Old and Coenties Slips, Hanover Square and Pearl street, and Wall street and Coffee House Slip. Deportation of the inhabitants prevented panic and saved life.

In 1822 yellow fever elected a new field of infection in the city; beginning at the foot of Rector street, spread slowly but surely up Rector, Greenwich, Lumber, Washington, and Cedar streets, across through Wall, Liberty, and over the whole of the southern quarter below Fulton street, and continued its march northward on the west side of Broadway to Chambers street. During the last half of September it went across town at a single stride, overleaping the entire Third ward, and planted its infection in what is now called Hamilton street, then Cheapside, next in Monroe street, and then in Lombard street, and from this point it extended northward through that region of the Fourth and Seventh wards of the city. This exceptional focus was established by the transfer of a chest of infected sailor's clothing, which was opened and washed in a laundress's yard, between Monroe and Hamilton streets; and this was the point at which the fever took its new departure.

The sanitary regulations by which the inhabitants of the infected districts, and of the margin of the blocks next to the infected district, were ordered back northward to the extent of 100 yards or more (every few days), and moved into salubrious quarters, limited the fatality of the epidemic by cutting off its fresh supplies of population. It has remained the best of all illustrations of the true lesson and methods for saving life and preventing panic of premises and grounds infected with the virus of yellow fever. The total number of deaths by the fever in this epidemic was 230. The number of fatal cases in the Monroe street district, which became infected after the middle of September, in the manner here mentioned, was 28. There is no evidence that any house or ground within the limits of the city has been infected with yellow fever since the 5th of November, 1822. It is true that in 1856 two patients that were brought to the quarantine hospitals on Staten Island, in a dying condition, with black vomit, came from two low lodging-houses, one in James street and one in Oak, in the city, but these were both traced to their exposure at the quarantine anchorage, one having served several days as a stevedore unloading an infected ship, and one having remained on the deck of an emigrant ship that was anchored only a few yards from an infected Havana vessel.

Records of yellow fever in the city and port.—From 1822, until the present time, yellow fever has continued to be brought into the port at the quarantine station, in vessels from the West Indian and Mexican coast. In 1823, 8 yellow-fever patients and 4 infected vessels arrived; in 1824, 28 patients and 6 infected vessels; in 1825, 2 patients and 1 vessel; in 1826, 2 patients and 2 vessels; in 1827, 6 patients and 6 vessels; in 1828, 1 patient and 1 vessel; in 1829, 4 patients and 2 vessels; in 1830, 2 patients and 2 vessels; in 1832, 1 patient and 1 vessel; in 1833, 12 patients and 4 vessels; in 1834, 4 patients and 2 vessels; in 1835, 2 patients and 1 vessel; in 1838, 4 patients and 2 vessels; in 1839, 25 patients and 10 vessels; in 1843, 18 patients and 6 vessels; in 1844, 9 patients and 4 vessels; in 1845, 2 patients and 1 vessel; in 1846, 1 patient and 1 vessel; in 1847, 2 patients and 2 vessels; in 1848, 26 patients and 9 vessels; in 1852, 1 patient and 1 vessel; in 1853, 44 patients and 15 vessels; in 1854, 45 patients and 12 vessels; in 1855, 12 patients and 6 vessels.

In 1855, the year of the great epidemic at Norfolk and Portsmouth, Va., two patients were received from those stricken cities, and the sloop-of-war Falmouth arrived from Key West on her West Indian cruise, with several sick and dying patients on board. One officer in the quarantine hospital service took the fever from his exposure in landing the sick from the Falmouth. The disease did not spread at the quarantine establishment.

In 1856 there occurred a severe epidemic upon the quarantine grounds at the northeastern extremity of Staten Island and along the bay of New York, upon both sides, extending from the quarantine grounds southward nearly 3 miles; and extending along Bay Ridge south of Brooklyn, and from near the line of Greenwood Cemetery southward, quite beyond Fort Hamilton, and at separate points in the vicinity of Gravesend Bay and Coney Island. There were 77 vessels from West Indian ports during the summer of 1856, recognized as being infected. Ninety-two victims of the fever were taken directly from the infected vessels to the quarantine hospitals; 15 patients were received from the city after their release from vessels by the health officers, who believed them free of infection; 34 stevedores employed in the unloading of infected vessels were brought into the marine hospital wards; 33 officers and employés of the quarantine hospitals were attacked with the fever; 33 residents along shore outside of the quarantine hospital grounds, and not known to have been employed upon the vessels, were attacked with the fever; 158 residents on the Bay Ridge or Long Island shore outside of Fort Hamilton were attacked; 31 members of the military force within the redoubt of Fort Hamilton were attacked; 29 residents of Brooklyn who had been variously exposed were attacked; 64 inmates of the south battery upon Governor's Island had the fever, and 46 residents of New York City who had been variously exposed to infected places or infected vessels outside the city in the vicinity of quarantine, had the fever; 50 patients in all were brought from the city to the quarantine hospitals, this number including those that had left infected vessels, as before mentioned. A single point on the New Jersey shore, known as Caven's Point, became infected. Four persons from the infected house were brought to the quarantine hospital, and it was ascertained that the owner of the infected house was the first victim of the fever there, and that his widow and other members of his household were also attacked by the fever. A hair mattress and pillow lashed upon it, which had floated ashore and was not completely saturated, so fresh had it been thrown overboard from some infected vessel, had been brought into that dwelling-house, after three or four days' exposure to the sun, and is reasonably supposed to have been the source of the fever there. Cases of yellow fever occurred in Jersey City and in Hoboken during the autumn of 1856, but no official record was made of them, owing to the absence of sanitary organization in those places.

The first case of yellow fever upon the quarantine grounds in 1856 was that of the assistant physician of the quarantine hospitals; and his attack was traced directly to exposure upon the dangerously infected ship which he visited on the evening of June 18. This patient came down very severely with the yellow fever early on the 24th of June, a little more than five days from the hour of his exposure in the cabin of the ship Julia M. Hallock, which had arrived in distress, all on board sick, from San tiago de Cuba.

On the 17th of July three cases were discovered in a small cottage by the water-side on the Staten Island shore opposite the quarantine anchorage. Other cases occurred in the same locality during the succeeding four days. This locality is nearly two miles south of the quarantine hospitals. Refuse dunnage from the ships in quarantine, many of which were then transferring their cargoes to lighters, had infected that part of the shore.

At the same time, and even a little before, there had occurred five cases and three deaths, wholly unknown to the public authorities, on the Bay Ridge shore of Long Island, among persons who were directly exposed to quantities of bedding and waste material which had drifted along shore and lodged in great quantities in the little coves where these people resided. On the 22d of July two residents within the quarantine grounds, immediately upon the water-side, were attacked with the fever; and the day following two other inmates of the cottage nearest the water upon these grounds were attacked. Three of these five cases died. It was discovered that several bales of old rags from the ship Jane H. Gliddon had been improperly conveyed to a United States government dock, adjacent to the pathway that led to these three cottages in which the first five cases occurred on the hospital grounds. Sanitary precautions were adopted which seemed to protect all the inhabitants of these grounds except those who were upon the water-side. The grounds back from the water-side being terraced so as to form two or three plateaus, all those terraces were from 20 to 70 feet above the tide-level. Up to the 23d day of September there had been no exception to this fact, and 25 cases had occurred on the hospital grounds among its officers and their employés and their families. After that date 8 cases occurred upon the terraces, under circumstances warranting the conclusion that the infection had found its way to these higher altitudes. Thirty-three cases in all occurred among residents of the hospital grounds.

In the villages and on the country roads at various places, 65 cases were found on Staten Island, all of which were traced to intercourse with the vessels or to some positive exposure to infected material that floated or was brought ashore from vessels in quarantine. Twenty-nine of these cases were stevedores who resided on Staten Island.

On the Long Island shore the infected district extended several miles, as we have *already* mentioned, but it extended inland scarcely a mile. Accurate records of 158 cases in that open rural district were traced; and 31 other cases occurred in the redoubt of Fort Hamilton among the military population there, and 34 cases were conveyed from Brooklyn and other portions of the water-front of Kings County, to the Public Charity Hospital at Flatbush; and 18 of these 34 cases died with black vomit.

The records of yellow fever in the port of New York in 1856 are summarized as follows: Total number of vessels from infected places and giving evidence of being themselves infected, 79. These vessels sent to the quarantine hospital on their arrival in port 72 sick. They had also buried at sea 53 seamen, and they had 60 others still surviving who were sick with the fever during the passage to New York. Never before in the history of the commerce of New York had so large a number of vessels arrived in an infected condition at that port. The admissions to the quarantine hospitals and the cases reported to and investigated by the writer of this report, who was then the physician in charge of those hospitals, were classified as follows: Admitted to the quarantine hospitals from the vessels on arrival and subsequently, 92 cases of yellow fever; admitted from the city of persons who had left these vessels while yet infected, 15 cases; admitted stevedores employed on infected vessels but residing in the city, 5 cases; admitted stevedores employed on infected vessels, residing in villages of Staten Island, 29 cases; admitted residents of New York who had been exposed to infected material of vessels, 46 cases; admitted residents on the quarantine grounds, 33 cases; admitted residents on the quarantine grounds of Staten Island (*other than stevedores*), 33 cases. Number of cases in the military hospital in the redoubt of Fort Hamilton, 31; number of patients among residents of Bay Ridge and other parts of the Long Island shore, 158; total number of cases reported in Brooklyn, some of which were removed to quarantine and others to the Flatbush Hospital, 29. Two separate structures on Governor's Island became infected at the beginning of August, and there occurred in them 65 cases of fever and 15 deaths. The total number of cases of yellow fever, well verified, exceeded 500, and nearly 400 of these occurred among residents of the water-sides, opposite the anchorage ground where infected vessels were that season detained, while discharging their cargoes and awaiting their release from quarantine.

Yellow fever in 1857.—There were 9 infected vessels, and 30 patients with yellow fever at quarantine. The first of the infected vessels arrived from Gonaives June 12, laden with sugar and dye-woods, and the captain and mate of this vessel having died at sea. The consignees employed a master and ship-keeper, who came from Bangor, Me. He went on board and remained until the beginning of the eighth day superintending the discharge of the cargo, &c., when he was seized with the yellow fever and died on the tenth day of his disease.

Yellow fever in 1858.—One hundred and forty-three infected vessels arrived from 18 infected ports. There were 197 sick persons with the fever received from these ships, or after having been employed upon them, and there were 12 more patients received from the city after having been exposed to the infected vessels or their cargoes.

Yellow fever in 1859.—There were 38 infected vessels from 10 ports, and giving 10 patients with the fever that year.

Yellow fever from 1860 *to* 1865 *inclusive*.—There were 52 infected vessels and 10 sick in 1860; there were 58 infected vessels and 20 sick in 1861; there were 57 infected vessels and 47 sick in 1862; there were 26 infected vessels and 73 sick in 1863; there were 58 infected vessels and 56 patients with the yellow fever at quarantine in 1864; and in 1865 there were 232 vessels quarantined for yellow fever, 53 having the fever on board. There had been 244 cases of sickness in 52 of the vessels and 37 were taken from the vessels to the floating hospital at quarantine.

Yellow fever in Brooklyn.—The occurrence of a limited area of infection on two occasions at the Wallabout, one in the vicinity of the present Brooklyn Bridge Pier. The latter outbreak was in 1809, and was complicated by local nuisances which were charged with having caused it. In 1856 there was evidence of infection of yellow fever in two houses, but frost put an end to the causes, whatever they were.

Yellow fever on the western shore of New Jersey.—Opposite the upper quarantine anchorage, and within the southern limit of the present area of Jersey City, the 9 cases of yellow fever which occurred in the one insulated dwelling-house on Caven's Point, in the summer of 1856, we have marked on the map the point of land on which the Jersey side of the harbor of New York was infected in a fatal way.

The history of the infection of a single dock and one block of buildings at the water side in Perth Amboy, in 1811, is given in our account of the sanitary condition of that port.

BROOKLYN.

The water-front in Brooklyn exceeds 10 miles, extending from the Bay Ridge Bluff, a mile south of Gowanus Bay, northward and eastward to Hunter's Point and Newtown Creek. The extreme length of the city, from northeast to southwest, is 8 miles; its mean width is less than 3 miles, and its total area amounts to 20.8 square miles, or 13,300 acres. Though consisting mainly of elevated bluffs and ridges of gravel and bowlders, of ancient glacial piling, there are four extensive areas of salt marsh and low level districts communicating with the western and northern water-front. Though these low districts, which comprise 2,000 acres, are now mostly filled in or diked off so as to be now occupied in part, they are especially noticeable as the insalubrious districts in which life and health are at a discount, and the sanitary welfare of the port jeopardized. They are still known as the regions of the Gowanus and Wallabout Bays, and as the marshes of Bushwick and Newtown Creeks. Upward of a thousand acres of these primitive marshes still remain unclaimed.

The filled-in, or made land, along the water-front, is shown upon the map (No. 1, appended statement, Brooklyn), and the limits of existing marshes are marked in color.

The city engineer states that 31 per cent. of the city area consists of streets which now measure, in total length, 546 miles. Nearly 300 miles of this distance is paved, and the greater portion is sewered,—the aggregate length of sewers now amounting to —— miles. Vitrified pipe has been laid down for a distance of —— miles, and brick sewers are built the residue of the distance, or —— miles. There are sixteen sewerage and drainage districts, and, at present, eighteen or more outfall sewers. The total quantity of outflow from these is estimated at from 40,000,000 to 50,000,000 gallons daily. The Brooklyn system of sewerage and drainage, when carried out, certainly admits of remarkable perfection. Expensive works remain to be executed for a larger extent of lowland.

Brooklyn commercial district.—The nearly 10 miles of water-side may, for reference purposes, be mentioned under the following divisions, beginning on Newtown Creek, the upper boundary:

1. Hunter's Point (Newtown Creek) to the navy-yard (the Wallabout);
2. Navy-yard to Fulton Ferry;
3. Fulton Ferry to Atlantic Docks;
4. The Atlantic Docks;
5. Red Hook to Erie Basin;
6. Erie Basin;
7. Gowanus.

The importance of these districts respectively, and the relative importance of the entire Brooklyn side of the port, may be correctly estimated by the following statistics of the shipping in port the day previous to the writing of this page:

Total number of sea-going vessels in port	627
Total number found on Brooklyn side	271
Total number found, namely, between Hunter's Point and navy-yard	34
Total number found, namely, between navy-yard and Fulton Ferry	27
Total number found, namely, between Fulton Ferry and Atlantic Docks	83
Total number found, namely, at Atlantic Docks	60
Total number found, namely, between Atlantic Docks and Erie Basin	5
Total number found, namely, in Erie Basin	31
Total number found, namely, in Gowanus	31
	271
The total number found at the water sides of New York City, September 20, was	165
The total number upon the Jersey side was	119
The total number at Staten Island	113

This exhibit of the relative importance of Brooklyn shipping front is borne out by the custom-house records for the year 1878, wherein it appears that —— vessels discharged cargo at the docks and warehouses of Brooklyn, and —— at the docks and warehouses, New York; and that there were —— tons of merchandise debarked from sea-going vessels on Brooklyn side, and —— tons on the piers of New York.

Brooklyn docks and piers.—Private ownership controls nearly the entire water-front of Brooklyn, and so long as that ownership constructs piers and docks in conformity to the statutes which regulate the harbor lines there is no interference with the plans or the imperfections of the structures. Wooden crib-work of an obstructive and faulty kind constitutes the great bulk of these structures. In some instances piers have been extended outward upon the harbor-lines perforce of special acts of the legislature. The absence of authority in the municipal government prevents interference with these evils. Though the present transitional period of cheap and faulty structures may not be marked by epidemics nor be signalized by the infection of a district of docks and piers, it must be confessed there is great possibility that both these calamities may befall Brooklyn. Fortunately for the future sanitation of this 10 miles of water-front and the more permanent commercial structures that will be built upon it, there are no riparian franchises there which can in any effective way interfere with the sanitary and engineering authority that may be interposed by the State, or by the State shall be conferred upon the city. Ardent controversies now in progress concerning the misuse and nuisance of extensive pieces of the water-front property both in Kings and Queens Counties, and most offensively along the Newtown Creek, within Brooklyn City, will inure in wholesome legislation and a reasonable sanitary interference for protection against sources of danger to the public health.

External sanitary police of Brooklyn.—Quarantine.—As in the city of New York, so in Brooklyn, the municipal board of health requires all vessels which are subject to quarantine, or that have already received *pratique* at the quarantine station of the port, to apply for and obtain permission of an official kind at its office. This feature of the sanitary code of Brooklyn has been entailed by its direct derivation from the Metropolitan Code of 1866–'70. It has been sharply resisted, often evaded, yet is important, and has been recently sustained in the supreme court.[1] The board of health maintains a system of water-side and ship inspections, and for obvious reasons this branch of sanitary service has been deemed so important that two or three sanitary officers have been kept at work in this special duty the past few years, during the warm season. This watchfulness has been none too great, for not only has the occasional proof of survival and the beginning of propagation of yellow fever been discovered on West Indian vessels, but endemic diseases of foul ships and abundant causes of filth diseases have been discovered and brought under sanitary treatment.

Relations of Brooklyn to the port quarantine system.—The following passage, which we quote from the Sanitary Code of Brooklyn, shows that this city is as fully aided by the port quarantine and health officer as New York is: " * * * The health officer of the port of New York * * * shall also receive into the floating hospital all cases of yellow fever found in this city and the port aforesaid; he shall not send or allow to return to the vicinity of said city, without a permit of the sanitary superintendent, any person, vessel, or article which this board has ordered to quarantine." (§ 139, Sanitary Code.) The ten articles of that code relating to vessels, cargoes, and quarantine measures will be found under the proper title—Brooklyn quarantine and vessels with sickness.

Confused and sharp as the controversy occasionally has been between the municipal and State quarantine authority, the stimulus to vigilance has never been too great.

Provisions for quarantine isolation in the city.—Until the present summer there had been no other than the almshouse hospital at Flatbush offered. The arrival of refugees from Memphis induced immediate action to provide temporary asylum and complete isolation and needed disinfection for infected persons and clothing. A brief description of this new institution or its methods is herewith appended.[2] While the general quarantine system of the port of New York has always offered its facilities for the isolation and care of whatever the State methods are responsible for, Brooklyn has frequent occasions for providing instant means of isolation of the sick or whatever materials are found to be infected with pestilent contagion. These new sanitary measures are timely. There is need of some enlargement and improved outfitting of such local facilities in each of the cities.

JERSEY CITY AND THE HARBOR-FRONT, HUDSON COUNTY, NEW YORK.

As the tide-water defines the western boundary of New York Harbor, the nearly 15 miles of New Jersey shore, upon which the Ferry landing at Jersey City marks a central point, constitute an important portion of the harbor-front of the port of New York.

The perpendicular buttress of serpentine rock called Castle Point, on the New Jersey shore, opposite Fourteenth street, New York, and only 1,000 yards westward from the latter, being taken as a standpoint for outlook, the long stretch of coast-line and shoal-water southward bearing west to the Kill von Kull and the opening from it of Newark Bay presents at one view nearly 10 miles of the tidal boundary of the harbor on the west. Nearly all of this extent was originally and mostly is still a marshy coast-line, with here and there an islet and sandpit. Harsimus and Hoboken were, indeed, islands of some magnitude, while Powles Hook and Communipaw were islets and spits which marked the founding of Jersey City. Back to the westward of these narrow land-fronts the estuaries penetrated westward and northward quite to the vast wall that is the southern terminus of the Palisade range, which disappears under Newark Bay and the Kill von Kull.

Again, from Castle Point or the mansion of Commodore Stevens, looking northward, the ship channel of the Hudson is followed for miles, but the land-front available for commercial purposes extends scarcely to Bull's Ferry, or only about 4 miles. Here the tidal channel is deep, but the land margin is narrow and interrupted by the rocky spurs of the Palisades. Back of the Castle Point rock and the ancient island of Hoboken, back of Harsimus and the original Powles Hook, or old Jersey City, and down to Communipaw and still nearer shore to Caren's Point, and nearly to the region opposite the north headland of Staten Island, extended the tidal estuary and marsh which until a recent time divided the upland towns from some 10 miles extent of the western front of the harbor. From north to the southward there were Weehawken, Hoboken, Harsimus, Jersey City, and Communipaw, wholly or in part, thus separated by the sluggish tide-water and back bays which occupied a broad area along the foot of the Palisade ridge. That extended and tortuous line of tidal swamps has been invaded, and, at various places, partially filled in by demands of trade and the speculative control of proprietors. Now there remain several shortened estuaries which extend far in toward the rocky upland, but are no longer connected with each other so as to be self-cleansing. Each one has been variously obstructed until, instead of being a tidal stream with a cleansing ebb and flood, it is, rather, a series of vast pools and mud-beds or fresh-water marshes.

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[1] Case of the president of the Ship-Owners' Association against the Brooklyn board of health.—Pratt, J.

[2] Appended statement, Brooklyn.

The original back-bay and tidal marsh covered in Weehawken nearly 400 acres, and constituted the northern mouth of the back-stream of tide-water; in Hoboken, 450 acres west of the island of Hoboken, the latter (upland) embracing only about 270 acres; in Jersey City (as now embracing also Communipaw and part of Lafayette and Greenville), 700 acres; the solid ground and filled front amounting to 1,400, but not included in this class of lands; in Bayonne, 450 acres opposite the north headland of Staten Island, adjacent to the narrow point which projects estward almost to Staten Island and known as Constable's Hook.

The total area of the original back swamp and tidal marsh thus exceeded 1,500 acres in extent. All of it is destined to be wholly reclaimed and built upon. A still greater area of lands under the tide-water along this Jersey side of the harbor is being filled in eastward towards the harbor-line. Upward of 2,000 acres may be included in this area acquired from the Upper Bay of New York, and not less than 3,600 acres, or about 5¼ square miles, will thus be reclaimed from tide and swamp. This region will again be referred to in connection with sanitary problems of the port.

The present shoal-water front of the Jersey side of the harbor.—The extended front, as measured from Weehawken to Constable's Hook, or Bayonne City, is already so disposed of by the riparian authority of New Jersey that it is in process of being transformed into a broad commercial waterside pushed far eastward. The areas which, at the present time, are being filled in and extended channelward by crib-work and piles, cover upwards of three square miles.

These recent aspects of the western margin of the harbor of New York are important in their relations to future sanitary defenses of the port. We mention them separately now from other matters of notable importance on this shore, yet in the near future the problems of drainage and sewerage and other matters pertaining to the 1,600 acres of the old back-swamp tidal areas and of the entire waterside region from Weehawken to Bayonne will be treated in common with the same matters of sanita-
tion of vast area that is now being reclaimed from the bay and western shoal of th
harbor of New York; and when commerce and great capitalized interests have supe
seded the nomadic fishermen and clam-rakers of the Jersey side shoal waters, the du
and cost of the needed sanitary works may be effectually provided for. In every ser
the behests of commerce will be conducive to sanitary improvement.

The drainage of Jersey-shore cities.—Difficult as the chief problem of drainage
be, we mean that for the 1,600 acres which for the present are at and below tide-le
the plans for sanitary drainage, both on the upland front and on still higher upl
upon the terminal Palisade ridge, seem to be in competent hands. Beginning a
north, the Bull's Ferry drainage district is a worthy model of study and treat
(See map of that drainage and sewerage district, in maps appended to this r
Proceeding from Hoboken to the hill region southwestward, the drainage pr
comprise two questions that require some costly work: the first relates to t
plete drainage of basins of ancient glacial wearing in the summit rocky be
the other relates to the safe outflow down the precipitous hillside and across
marsh and front land to the open channel seaward. The first question has s
been evaded by the process of earth-filling of the rock-basins, but has, in
like that on Water street, near Summit street, Jersey City Heights, been tre
perly by finding and deep-cutting the rim of the bowl and so conveying
drain and a sewer quite clearly through the locality that, except for this,
remain afflicted with house-dampness, malaria, and zymotic evils. (See
low.) The extensive area just mentioned as an instance was so afflicte
forever redeemed from these domestic evils. (See map of Hill-Drainage
The conducting of outfall drains and sewers down the steep hills is wel
recently executed work under the expert supervision of the civil engir
furnished me the copy of map of Bull's Ferry drainage district. (See
trict, appendix).

EXAMPLE OF DRAINAGE OF ROCK-BASINS BY INCISION OF THE R

of 1866, after cholera had ceased in New York, it was i
of these rock-basins of the summit of the Palisa
and tributary privies, made terrible ha
of what he saw: "The epidemic c

the 'filled in' grounds that covered certain basin-like cavities of the rocky bed of the city. Wherever it occurred in those places it was a neighborhood pestilence. Beyond those places, and on the highest bluffs, certain families, living in a very negligent and filthy manner, suffered simply a house-epidemic. The principal streets and the well-drained portions of the town remained free from the epidemic."

These practical questions have to be met in every mile of the extended area of Hudson County. Even in the southern portion of Jersey City the hill drainage and sewerage is at points siphoned beneath the Morris and Essex Canal and a tidal stream, in order to conduct the outflowing further seaward.

Sewerage.—The problems of sewerage are in expert hands, but still are awaiting execution of proposed general plans. It is safe to premise, however, that the hill or continuous upland system of sewerage will, in the main, be successfully treated, and in great part completed independently of whatever plans may ultimately be adopted for the tidal region and its interrupted islets and spits of upland. The latter region altogether comprises about 3,470 acres, nearly half being tidal levels (not counting filled-in water front, nor any of the marsh lands on the Hackensack), while the true upland region, extending uninterruptedly more than 10 miles southerly from the north boundary of West Hoboken, comprises 6,720 acres. More of the latter area will drain eastward into the harbor than westward into the Hackensack, and in the ultimate completion of the system of sewerage much more will have to be conducted eastward and southward than to the westward. The intercepting mains, the siphons under the canal and other waterways, a remote reservoir and a pumping system for the ultimate deliverance of the sewage which shall thus flow eastward and southward, may solve all difficulties, and prove that the annual cost of the maintenance of a competent system is far less than the wasteful losses of vacilating plans and unsystematic public expenditure for sewer improvements.

Viewed in its relation to the system of sewerage and drainage which the Jersey shore of the harbor of New York needs, the extensive occupation of the water front for commercial purposes promises a way and the means for completing such sewerage works as the sanitary welfare of the line of these Jersey side cities requires, and which the sanitary protection of the harbor of New York demands. To illustrate some of the existing misfortunes in the sewerage of the low-level districts, the diagrams facing this page are contributed by the city surveyor.

Endemics, epidemics, and death-rates on Jersey side.—As this subject is at present being carefully studied by a competent committee of medical gentlemen and civil engineers, who, working in concert, are sure to present useful conclusions, whatever they may be, and as that committee and another which is at the time of this writing organizing for a careful sanitary survey of the harbor-front municipalities, will have completed a sufficient extent of their investigations before midwinter, or the next spring, it will be quite needless for me now to review the facts in my possession on this subject. Suffice it to say that the evidence of an excessive death-rate upon the entire low-land and undrained area of the Hudson County district is convincing and very significant, and the special significance relates to the zymotic and child mortality as being so far excessive as to demonstrate in a particular way how directly the wetness of building-grounds and the defective outflow from common dwelling-houses make numerous common maladies excessively prevalent and enormously fatal. The extent and various features of the districts in which the records of mortality, the death-rate in each ward and block of dwellings, and the environing sanitary conditions and topography are grouped and analyzed by expert minds, certainly promise results more definite and valuable than hitherto have been attained in the preliminary investigations which have preceded sanitary reforms upon so extended an area beyond one or two large cities in our country. The conclusions in these investigations, as well as outlines of certain suggested sanitary improvements, are to be submitted to the National Board of Health in due time, under arrangements by which the board is encouraging this preliminary survey. But while mentioning the researches now in progress, I must present one historical item from the records of yellow fever in 1856 which concerned the region we are here describing. It is, briefly, as follows:

While the eastern shore of Staten Island and the Bay Ridge shore of Long Island were suffering from the imported infection of yellow fever in the summer of 1856, a farm laborer was admitted to my care in the quarantine hospitals July 23. He died the next day of black vomit. September 4, four persons, members of one family, who were spending the last of summer at the single old mansion on Cavan's Point, 4 miles south of Jersey City Ferry (see map), were brought to my wards. Three other cases of yellow fever had occurred in the house at Cavan's Point, and as the malady was no other than this fever, the circumstances of its introduction as an exotic infection in that remote and isolated dwelling by the harbor side were very carefully investigated by me. The report of the facts as communicated to the legislature of New York showed that the owner and occupant of the dwelling, during the last of August suddenly sickened and died of yellow fever, and that he had, a few days previously to his illness, drawn ashore a new cabin-mattress that was so recently from some vessel that it was not yet saturated by the flood-tide on which it had ridden in to the point at which it was saved and dried. The gentleman was so pleased with this fresh hair mattress that, as soon as dried, he placed it in a chamber alcove and slept upon it while his house was overfilled. His wife became ill, but recovered; a lady and son, of the family which was soon conveyed to my wards, sickened and died of yellow fever. Thus we traced eight cases of the malady presumed to be due to the mattress, and of these at least three were fatal. These incidents sufficiently show with what facility the scourge of our tropics may become fatal to our bay sides and into any dwelling. Several persons, directly from shipboard and from infected places, have in various years been found sick with yellow fever in Jersey City, but we have discovered no instance in which the malady has spread to other persons, or in which a house has become infected. The house or premises at Cavan's Point, upon a narrow peninsula nearly a mile from other buildings, certainly became infected in August, 1856, and that accident occurred in such a way as to convey a most useful sanitary lesson, now that commerce will soon occupy upon the Jersey side a longer uninterrupted extent of the New York Harbor front than it now does upon any other shore of the five counties facing this port.

The malarial maladies that have afflicted all of Hudson County (New Jersey) from earliest records, already disappear from its well drained and sewered districts, even in Hoboken and Jersey City, and they can be banished from the entire eastern slope and harbor front of the county under the engineering and structural improvements now necessary to the welfare of commerce. When systematic drainage and the low-level sewerage shall have superseded the present bad conditions, and when sanitary policing of well-constructed and constantly supervised docks and warehouses along the harbor front from Weehawken to Cavan's Point, and further, shall have succeeded them, the defense against yellow fever may be made more complete than ever before, and the malarial diseases of that region will not persist in the presence of such local improvements.

BRIDGEPORT, CONNECTICUT.

With the secretary of the State board of health of Connecticut, I made an inspection of Bridgeport, and having then arranged for a detailed inspection and report upon all points given in the printed schedules which will be completed and submitted for the use of the National Board as well as the State board of health, it is well that my report should relate only to the sanitary aspects which are important to the commerce of Bridgeport and the country.

The United States customs district of Fairfield embraces Bridgeport, and has located port business here. The vast manufacturing interests of this city have centralized at this point nearly all the commerce of the Fairfield customs district, which extends from the New York boundary to the western limit of New Haven district. The renowned haven and port of old Fairfield, scarcely 10 miles away, are now superseded by this new port and factory city. The public health questions, which have chief importance here now, relate to what causes of disease may exist and breed in Bridgeport and be communicated by its population and exports, rather than what may be brought into the port.

In the statistical abstract of the commercial data of ports (see Appendix) the fact appears that the total value of manufactured products which Bridgeport sends away annually exceeds $ ——— ; and her trade by way of tidal waters brings ——— coastwise vessels and ——— vessels from foreign ports to her wharves. The amount of sickness among the crews of these vessels is fairly estimated from the records of the official permits to hospitals granted by the collector of the port. He states that he gave only ——— such permits in 1878, and only ——— in the first half of the year 1879. Though yellow fever, in the last decade of last century and the first in the present, did invade the port landings of Norwalk and Stamford, in the Fairfield port-district, Bridgeport has scarcely other liability from its presence than such as is common to railway towns in which the baggage of refugees may arrive.

Area and surface geography of the city.—The corporate limits of the city originally comprised only 3½ square miles. The addition of the suburbs of West Stratford extends the area to 5¼ square miles, and brings its eastern boundary far beyond the Pequonnock River, toward the mouth of the Housatonic. The underlying rock is mainly trap and its porphyritic associates, and the surface deeply overlaid with gravel and loam, for the most part, makes Bridgeport a city of gardens and good building-grounds. Nearly one-third of the area is so little elevated above tide-level that its natural drainage is incomplete; yet, since the extensive salt-marsh in front has been measurably reclaimed by means of a long stretch of sea-wall, and the drainage and other improvements by which several hundred acres along the sound west of the port have been transformed into a public park, the entire low-level district of the city has been made susceptible of perfect drainage and sewerage.

The sewerage system.—There are now about 20 miles of sewers. There are 16 sewer outfalls into the sound and the west side of the Pequonnock River, and 7 into the west side from the fifth and sixth wards, or East Bridgeport. These 23 sewer openings, at their tidal outfall, are shown upon the sanitary map of Bridgeport. (Appended.) The two outfalls which deliver the greater portion of the first and all of the second ward sewage are noticeable as being at mean low-tide level and in some degree depending upon the ebb-tide for cleansing. The outfall trunk for the second ward sewerage is 33 and 49½ inches, and is washed by the tides along a distance of 2,550 feet. Our inspection of that sewer at its outfall and along its low-level tributaries warranted the conclusion that all the sewage outflow which now defiles the harbor and the southern section of the Pequonnock, the commercial center of the city, could readily be conducted, by a system of interception, quite beyond the city seaward and into the most rapid ebb-tide.

Streets and pavements.—There are nearly 61 miles of public roadways and streets, besides some 18 miles of streets not yet graded and paved. Only about 4 miles of streets are well paved or macadamized. There is no wood pavement. The gutters and catch-basins are not in good condition, nor are the streets sufficiently clean for security against zymotic diseases.

Parks.—The five public parks now cover 120 acres; and the Seaside Park, which now has 59 acres improved and destined to be extended a mile westward over the partially reclaimed salt-marsh, greatly to the advantage of the public health. "Waldemere," an open private park communicating eastward with the present Seaside Park, looks out westward upon the marsh, towards Fairfield.

Water supply.—From upland ponds in towns at the northward the supply of water is ample and of comparatively pure quality, though from surface gatherings and imperfect storage. It now flows into the city at the rate of 100 gallons per capita daily.

Excreta, and sewer connections.—Yard privies still prevail, and the night-soil and offal are removed by the city authorities, under regulations. As the privies are a recognized evil, and public attention has been called to their probable relations to certain filth diseases, and especially to the persistence of diphtheria in various districts, the improved methods of guarding the house connections with the sewers should be substituted for the privy system; but this city suffers from general neglect of nuisances against health. yet not from corruption of the municipal government, but obviously from the want of trained sanitary inspectors.[1]

Abattoirs and butcheries do not annoy the city, for this branch of business is all conducted beyond city limits and by private enterprise. All the offal and waste of the butcheries is utilized—mostly as swine food.

Public schools, 18 in number, are crowded, but carefully kept. The manufacturing population is prolific in its family estate, and fortunately all good artisans in this city may easily elect to live in the family cottage. There are —— children at school ages (—— of age) in the city, in a total population of about 25,500.

Public health government.—The board of health is constituted of four elected members and the mayor, the latter nominating these members annually for election by the city council. The board has no executive or summary power.

PROVIDENCE, RHODE ISLAND.

As a great manufacturing center and as a port Providence is second to no other New England city in the importance of its public health questions, and it is foremost in the wide influence of its good examples of public works and personal service for the promotion of public health and wise economy. It is one of the first American cities that has dealt successfully with each of the public health problems as they have arisen in its growth in wealth and population.

Area and sanitary topography of the city.—The city now extends over an area of 10,016 acres, or nearly 15.65 square miles. Beginning on the head of Narragansett Bay, on the south near Fields Point, the city extends northward along the Providence River, which forms the central part of the harbor. The eastern area of the harbor is formed by the Seekonk River, as the northeastern boundary of the city; while the tide-stream of the Providence and Western Branch, known as the Woonasquatucket River which courses from west into the city, and the "cove" at the head of tide-waters of the Providence, bisect the city area into two chief drainage districts. These two districts, as shown upon the contour map (Appendix) are of nearly equal extent, and it is noticeable that the northeasterly one is partly divided by a valley and small stream (the Moshussuck River) descending from the north to the tidal head of Providence River, or head of the harbor.

The low-level and filled-in area.—Standing at the "cove," which is a tidal pond surrounded by a promenade in the northern center of the city, and looking northward along Gaspee street and the Market Place, and southward and southeastward along the course of Donance street, and still south and eastward over a broad area of closely built streets on the west side of the upper harbor and across the eastern side of it at Fox's Point and the region of the "Old Colony" landing and depot, the extent of the areas once covered by high tides exceeds 40 acres, now an essential portion of the commercial center of the city. This ground which has been redeemed from tide-water is sufficiently well defined for our sanitary note concerning it by the contour line of 10 feet equal elevation nearest the water front. (See contour map.) Mr. J. Herbert Shedd states that most of the ground "inclosed by Providence River, Ship street, Eddy street, Cove street, and Exchange Place, about 48 acres in extent, on which the most expensive buildings of the city stand, is only 3½ to 7 feet above mean high-tide." This extensive low-level area and the vast value of it in its present graded and compactly covered state, as the commercial center of the city, have determined some very important points in the new sewage system.[1]

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[1] While inspecting the southwestern drainage district and following the course of its sewers, I noticed several inexcusable nuisances of recently dumped garbage and excremental matters. As a citizen said, it was surreptitiously perpetrated by persons unknown. A watch for the perpetrator was instituted by that citizen. He writes, under date of October 8: "You will readily recall the spot on Iranistan avenue, near Fairfield avenue, where refuse had been deposited by the side of the road. The man and cart were caught at work. * * * He replied that he was directed to dump there by the —— commissioner."

Contour-map and surface of the city.—The low-lying surface of the southwestern portion, for the greater part of that which has become built up, the prolongation of that low level southeastward towards Field's Point, or the head of the Narragansett, and the elevated hillsides which form the western periphery of the low-land, make up the surface outlines of the western district. The eastern district is a picturesque highland, with very steep acclivities facing west and southwest. This high district and the entire city are upon a coarse conglomerate rock that rests upon a basin of granite, and the conglomerate is eroded and porous as coarse sandstone would be. The rocky foundation is deeply covered with gravel, and the natural drainage is amply secured. The diversified and depressed segment of the city that lies between the eastern and western district and bordering northward constitutes a small drainage area by itself, with its outflow into the Moshassuck, the terminal stream of Providence River at the north. The private dwellings, the university, the domestic gardens, and numerous institutions distributed upon ample grounds which extend over 2,000 acres of the eastern or hill district, have their reasonable sanitary record in the remarkably low death-rate of the population of that region. Facing the tide-waters of the Seekonk on the southeast and the Providence and its terminal Moshassuck on the west, this east district is a peninsula which presents its slopes southward and westward, at an altitude of from 130 feet (above tide) at the university grounds, 190 feet, along Prospect street to the summit, still northward, of 200 feet. Yet it was at the southwestern low point of this beautiful peninsula that yellow fever was again and again received and repropagated. That repeatedly infected area is marked by Y. F. on a shaded ground at that section of the map (see map of Providence, appendix).

The sewerage system.—The new sewerage system of the city is now so far advanced towards completion that its value and success in those respects which most affect the sanitation of Providence can be clearly stated. The 40 miles of street sewers now completed in the new system now discharge at frequent intervals along river and harbor front. The largest of them open at the river side at mean low-tide level, and they extend back some distance inland at about the same level and are flushed by the tidal flow. The crowning excellence of the system still remains to be attained in the construction of marginal intercepting sewers and conducting the aggregate volume of sewage southward beyond the city and into deep water of the Narragansett, below Field's Point. Until this final part of the system is executed the new sewer-outfalls must continue to defile the narrow and much-shoaled harbor.

The original suggestion of this excellent sewerage system in Providence seems to have been made in the first report of the superintendent of health of the city—Dr. Edwin M. Snow—in 1857. "The inequalities of the surface of the city," says that officer, "give every facility for a most complete and effective system of underground and surface drainage. Every foot of wet ground can be easily and completely drained, and all surplus water and liquid filth can be conducted in sewers with a rapid fall *to a single point*, or into the harbor."

Though the ultimate interception and forcible delivery of all the city sewage at some point beyond the city are not yet executed as final parts of the system, the sewerage map (appendix) shows that along some of the most important of the water-side districts an intercepting marginal sewer gives a distant outfall at some suitable point on the water-front. The step next in order, in the execution of the final delivery of the sewage, consists in siphoning the entire sewerage outflow from the eastern district to the westward shore of the Providence River, by an iron conduit (siphon) laid under the river-bed, and thence conducting the outflow of the entire city sewerage to the deep waters of the Narragansett at Field's Point. The $1,388,211, which the new sewers have already cost, perhaps fairly represents half the entire expense for this great work when thus completed. Important data relating to the Providence sewers, the provision for storm drainage, the nature and precise cost of structures, and the entire scheme of intercepting mains and low-level conduits and outfalls are appended with the map of Providence. (See appendix.)

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[1] The swamp fevers that frequently prevailed upon this western region and now business center of Providence were described by writers early in the present century.

Providence water-supply.—The enterprise that, by vote of the citizens, capitalized the cost of lifting an ample supply of pure and filtered water from the Pochasset River, a mile above its junction with the Pawtuxet in Cranston, at the southern margin of a water-basin 92 miles in area, 5¼ miles from the city, up to a storage reservoir 1,566 yards away from the river pumping station, and nearly 180 feet vertically, and thence by gravitation conducting the strain to the high-service stand and reservoir in the midst of the city, more than 5 miles, by course of an inverted siphon, is ample evidence of the value set upon the present water-supply of the city. The strength and perfection of both the machinery and the iron conduits and service-pipes are well attested by the fact that no interruption in machinery and scarcely a fracture of a conduit or pipe has occurred from the beginning until the time of this report. The high-service pressure is maintained so skillfully that no harm has resulted to the house-plumbing; but to defend the city against faulty works in plumbing, the municipal ordinances require plumbers to prove their capability and obtain an official license, and, where lead tubing is used, that a pipe of standard strength shall be employed. The official standards of the materials to be used and the trade competency of the plumbers enter into this account of the success of the water-service.

The cash receipts for the water used in Providence now amounts to nearly $200,000 annually, and the cost of maintenance reaches less than $90,000. The total cost of the work from first to last, inclusive of machinery and distribution, slightly exceeds $5,100,000. Thus the original cost is never to be a burden. The people elected the most complete and costly of the several plans and the most excellent of sources and quality of water-supply, and they enjoy the benefits, chief of which is that of sufficiency and sanitary purity of the water. In his report upon four of the proposed sources and plans Engineer J. Herbert Shedd remarked: "In view of the greater abundance of supply, purity of water, and permanence of works, I give preference to the Pawtuxet plan." This plan, as now in service, we have here outlined very briefly, and upon the map are marked its two reservoirs, which cover about 10 acres each, the river source and pumping station, the high-service stand, and the line of the main conduit from the storage reservoir in Cranston to the high-service stand, the accessory reservoir on Hope street, in the city. (See map, appendix.) A brief statistical statement of facts relating to the water and sewer systems of Providence is appended with the map.

Sanitary government and quarantine history in Providence.—The epidemics and prevailing diseases of this city had, at various times in eighty years, directed public attention to localizing causes of such diseases.

Yellow fever appeared near the wharf front of the town in August, 1797, and in the few weeks that remained of the summer it killed 36 persons. The infected district was so positively defined, and the source of the disease was so clearly traced to the bedding and clothing which was taken from the infected schooner Betsey, which had arrived on the 10th of August from Hayti, after having lost two men from the fever on the passage, that this first experience of yellow fever at Providence will ever be to our northern ports generally, as it was to Narragansett towns at that period, full of practical instruction. The first proof which the inhabitants had of the schooner's deadly infection occurred in the sudden sickness and death of a market gardener, who, from the Seekonk shore, put his boat-load of vegetables in tow of the Haytian coffee-trader and went on board for the short trip up to the Providence dock. Even at that early period the wooden docks and crib-work along that low water front were rotten, and the decaying matter thereabouts and the swamp on the opposite side of the river warranted the historians of that period in saying, as they did, that "the fever could not have prevailed as it did in Providence and Bristol had there not existed local causes."[1] Again, in 1800, in 1803, 1805, and 1820, yellow fever invaded this same area of the city, namely, along the east bank of the river from Wickenden and Transit, northward to Power and Planet streets, and eastward across South Main to the steep hillside. The events of these five visitations of yellow fever are so relevant to the practical discussion of the questions of quarantine and yellow fever that we have appended an abstract of the historical account of them as reviewed and verified by the eminent hygienist and statistician, Dr. Edwin M. Snow, of Providence (see appendix), who, during his protracted and yet continued experience as chief medical officer of the port and city, has treated infected vessels and their contents as the sources of danger from yellow fever, and required that they be removed to the quarantine anchorage in the Narragansett.

That the limits of the area infected, as well as the sources of infection, were accurately observed in the visitations of yellow fever is evinced in all the written record of them. We invite attention to the compact narrative as given by Dr. Bowen concerning the visitation in 1805 as an illustration of the trustworthiness of the recorded experience in Providence. (Appendix.)

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[1] See Dr. E. M. Snow's account of yellow fever in Providence, appended statements.

The laws and methods of quarantine, relating to yellow fever and such other maladies as may be subject to external sanitary police, are briefly as follows:

1. The statutes provide that in any seaport town in Rhode Island the town council, and in cities the board of aldermen, shall act as the board of health to give full force and effect to the quarantine laws and all laws relating to contagious and infectious diseases.[2] The functions of the State board are only advisory in regard to quarantine and other duties of the local boards or town councils, but the statute of 1857 gives ample powers to the councils, and in a special manner recognizes the paramount importance of the local quarantine authority and port sanitary regulations of Providence. (Section 9, chapter 75, Rev. Stat.) The discretion and decisions of the councils as local authorities is the law of the State, within the meaning and sanctions of the statute; and the penalties for violations of the quarantine regulations are fines and the total forfeiture of whatever goods are brought ashore without sanitary permission.

2. The quarantine ordinances and regulations of Providence are epitomized as follows by Dr. E. M. Snow, the superintendent of public health, under whose official hand they have been framed and administered:

"First. That all vessels arriving with any person sick with any contagious or infectious disease, or that has had any case of such disease on board during the passage, shall anchor at the quarantine ground, and remain at anchor with a flag in its shrouds until it shall receive written permission from the health officer to leave.

"Second. The board of health may require other classes of vessels, or vessels from infected ports, to stop at quarantine at its discretion.

"Third. The health officer has absolute control of all vessels at quarantine, with their crews, passengers, and cargoes. He is empowered to ask for all the information he may deem necessary, which the captain is required to give; he regulates all communication with the vessel, directs all measures for cleansing and disinfecting and for discharging the cargoes, and can detain the vessel, crew, passengers, and cargo as long as he thinks necessary. The captain or owners can appeal from the decisions of the health officer to the board of health, if they think proper."

The past history of yellow fever and cholera in Providence, and especially the records of quarantine in the city, and port, are so full of practical instruction that we give an outline of them in an appended statement, under the head of quarantine and yellow fever in Rhode Island.

Registration of vital statistics in Providence.—To the influence of a system of faithful registration of vital statistics, beginning in 1855, is due the pre-eminence which Providence has attained in its sanitary improvements, more than to any of the other agencies by which the public has been educated up to the standards of duty that are now recognized in that city. The circumstances and physicians' records of the individual deaths have been carefully studied day by day and year by year by a medical officer of superior ability, the domestic and local conditions of preventable mortality have been observed, and the sanitary questions affecting the city and its inhabitants have been analyzed so judiciously as to secure the public support of a great variety of sanitary measures and public works that have resulted in giving the city its pre-eminence in general health and a low death-rate. In a population of artisans and prolific families the average death-rate of 19.25 in the 1,000 inhabitants, the past few years, attests the results of good sanitary government and the prevalent conditions of domestic health in the city.

Rhode Island State board of health.—Organized in 1878, and having charge of the registry of vital statistics in the State, and being also charged with the service that formerly devolved upon the cattle-plague commissioners, the State board of health began its labors promptly, but, as respects the organization of direct methods of promoting public hygiene its powers are insufficient. The appeal to the National Board of Health for advice when an exigency was impending last month (August) was due to this consciousness of the State board's limitations of the right of interference if a town council remained inactive in the presence of vessels and materials presumably infected with yellow fever.[3] The proceedings of the State board in sanitary measures for stamping out *glanders*, which by the nomadic horses of showmen had been widely spread in the State, has awakened a practical interest in the duty of effectual separation of the sick with infectious maladies and a prompt disinfection of all contagia. Yet the State board, which, as respects cattle and horses, may prescribe the segregation of the sick animals and the destructive disinfection of their contagia, is not enabled to adopt or secure the adoption of similarly effectual sanitary measures for protection from the domestic pestilences which destroy children.

PORTLAND.

This city occupies the peninsula opposite Cape Elizabeth, which jointly make the excellent harbor by which the commerce of this port of Maine is secured. Extending as a lofty headland or promontory from the base at the west southward, bearing east, the promontory presents an abrupt extremity, which looks off southward and seaward in the face of numerous islands, that by their height as well as by deep intervening channels combine to give triple security to the harbor amidst some intricacies in its approaches.

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[2] Revised statutes of Rhode Island, chapters 74 and 75 (1857); and an act to establish a State board of health.

[3] *See appended statement*: The National Board in response to the Rhode Island State board of health *in the matter* of reported yellow fever in the refuge harbor of Jamestown.

The head of the promontory being abrupt and rising to an altitude of 150 feet, it has not yet been made available for business or habitations. The foot of the peninsula is some three miles inland and westward, and at the northwestern boundary of the city it has an altitude nearly as great as that of the eastern head-cliff two miles distant. But the long axis of the city in that distance is considerably depressed below these extreme points, so that it averages scarcely 100 feet above tide. Such was the old glacial erosion of the spine granite which has given this remarkable site for a commercial city, and the masses and blankets of gravel which cover the rock furnish good building grounds.

The shoal portions of the water-front upon the southerly side of the peninsula have been filled in so that the commercial front is nearly in line due northeastward to the seaward head. But from that head, rounding to the northwestward, the shoals and a land-locked "cove" show that all the water-ways of commerce are predestined to be exclusively upon the southerly side of the city. Commerce and manufactures already occupy that front in its deep slopes, while upon the northerly and very crescentic face, where the slopes are variously graded and diversified, the greater portion of the family residences of Portland are seen. The entire area of the crescentic hill-side overlooking the Back Bay, or "cove," is and doubtless will ever be devoted almost exclusively to the homes of this city.

Natural drainage.—Every portion of Portland admits of complete drainage. Even the somewhat basin-like depressions just southward of the terminal head-cliff are readily drained by cutting their lips. The most insalubrious and badly-drained district of the city will have to be improved by such means. The opulent districts southwestward, facing the inland section of the Back Bay, or "cove," enjoy admirable facility of drainage, yet, as will shortly be mentioned, the people have allowed this natural facility to become a fatal temptation to spill all sewage from their premises directly into the shoal and half-bare cove, the tidal covering of which recedes at every ebb so as to leave a hundred acres, less or more, of mud bottom reeking with this sewage from the hill-side streets.

Extent of city area.—The city comprises —— acres, and its water-sheds are about equally shared by the two main slopes northwardly and southwardly, yet there is apparently more sewage flowing toward the land-locked Back Bay northward and westward than toward the commercial front.

Sewers.—There are at present —— miles of regulated sewers, besides numerous private wholly-unregulated drains. The eleven sewer trunks which discharge the outflow upon the commercial front deliver the sewage mostly under the wharves, and in all instances, save one, at the bulkhead or land-front. The one exception is conspicuously a good example on a most primitive and economical plan. I refer to the sewer that has been extended under and attached to "Portland pier" just south of the custom-house. The sewage is conducted for some distance under the pier in a wooden box structure which is depressed quite below the low-water mark near its terminus, and in that terminal portion is left open at the top. The exit under water and in a deep current serves to secure its innocuous delivery seaward. That sewer outfall and its results are in striking contrast with the great sewer discharging under the wharf at the Atlantic dock a short distance farther seaward, where, in the midst of an acre of close timber and crib-work under the chief wharves of the sea-going steamers, the sewage remains offensively and very filthily adhering to and obstructing the interstitial cribwork and timbers, and seems utterly to fail to drift out to the deep swift currents.

Upon the northerly or "cove" side of the city there are no less than nineteen outfall sewers, and of these there are fifteen discharging directly into the "cove." The people have thus imperiled their health and have already suffered many an untimely death. These sewers discharge openly above tide, and, being imperfectly ventilated and poorly culverted, the sewer gases are complained of in all quarters. The general protestation of families against this effluvium nuisance has induced the present mayor of Portland to appoint two medical commissioners to make a thorough investigation of the nature and causes of this evil and to suggest practical remedies. Having been enabled to pursue my inquiries at Portland in connection with that commission, I will submit a report of the conclusions which it presented to the mayor as a correct statement of the facts which are most important to the public health of that city.[1]

The public discussion of sanitary questions that has begun in Portland cannot fail to eventuate in good results. The sewerage system admits very effectual treatment for perfect sanitary results at moderate cost, and the privy nuisance, with unregulated methods of scavengering must be first in the list of evils to be subdued by sanitary police measures and the improved engineering of the sewer and house-plumbing works. The marginal intercepting sewer, which will be proposed for the Back Bay side of the city, will give safe delivery of the numerous sewers of that most important region if the outflow is conducted seaward beyond the bridges; while the sewers of the southerly side, or commercial front, will readily admit of considerable concentration and seaward discharge beneath the outer terminus of piers which are built out several hundred feet to the deep channel where the tidal ebb and flood ranges nine feet and more.

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[1] See appended statement, Portland.

CONCLUSIONS.

Reviewing the facts we have examined in the sanitary condition and experience of the ports and cities of the North Atlantic coast, the conclusions that are most important and fully warranted are found to have reference more directly to their own sanitary state and their public health government than to perils from any sources of disease that are beyond their own control. Those conclusions relate, first, to the local conditions; second, to quarantine and other means for preventing the distribution or carrying and repropagation of infectious diseases.

CONCERNING LOCAL SOURCES OF DISEASE.

In each port and city the local causes of disease from filth, excremental filth especially, are found to be excessive at and near the tide-water fronts, and in New York, Boston, and Portland this evil has reached such magnitude that intercepting and distant delivery of the sewage into deep tide-water is already the leading sanitary problem of the municipal authorities. This problem is being practically solved and the work will be accomplished.

The other ports and cities of this coast have under consideration and seem disposed to adopt effective and economical methods for the distant outfall of all sewage. The example of the city of Providence, as illustrated in a statement here appended, shows how this problem is being treated.

The sewers themselves have to be investigated, and all methods of their connection with houses now demand exact study for the devising of adequate methods of protection against emanations from sewage.

The cleaning up and structural protection of the tidal water-fronts of cities have become a sanitary necessity.

The examples of the foregoing problems of public health, as now under treatment in ten of the cities mentioned in this report and illustrated herein by some of the works now in progress, are in evidence of the creation of a class of sanitary defenses of vital importance to the commercial world as well as to the individual cities.

The overcrowding of particular districts by the poor and ignorant classes is an evil in all the larger ports, and it is a source of danger that should be carefully restricted by municipal and State regulations in regard to sunlight and space for habitation, and the preservation of open grounds.

PUBLIC HEALTH GOVERNMENT.

The tendency and preference in each port and city decidedly favor a method of sanitary government which recognizes the municipal autonomy, and yet in the external sanitary police for quarantine purposes, and in the exceptional instances where drainage and sewerage of contiguous municipalities cannot be well settled upon, the best plan without co-ordinate agreements, there is evinced more and more a reasonable desire for the aid and counsel of a central authority of the State. This feeling in the several ports and throughout the States is favorable to the relegation to the State or the national government of all sanitary responsibility for the regulation of foreign immigrants, and for a strict surveillance of the vagrant and nomadic classes, for all these are now recognized carriers and propagators of diseases. We are warranted in concluding that the people in each of the eight States visited by the reporter on behalf of the National Board of Health the past summer would prefer that the regulation of all matters of quarantine against maritime carriers and against all nomadic propagators of infectious pests should be provided for under State authority; yet, as may consistently be, that municipal authority be amply sustained by State laws and by a State board of health for insuring efficiency and justice in such matters of external sanitary police. We may instance the ports of Providence, New London, and Portsmouth, and the cities of Jersey shore and those inland in Connecticut and New York, as supporting this view of external sanitary police service.

There is need of a careful revision, amendment, and codification of the public-health laws in nearly every city and in each State. The cities of New York, Brooklyn, Boston, and Providence have their respective sanitary codes quite elaborately prepared; but in each of the other cities, in almost every incorporated village, and notably in each of the eight States, but in Massachusetts least of all, there is urgent need of a scrutinizing revision and amendment of the public-health laws. In no other State is the need of such reform of sanitary laws so urgent as in New York. The States of Massachusetts, New Jersey, Connecticut, and Rhode Island have respectively obtained a good foundation in law for a State board of health. Whatever essential modifications are needed in general and quarantine laws for public-health interests those boards can secure.

MUNICIPAL DEPARTMENTS—PUBLIC WORKS.

The fact that in each of the fourteen cities inspected upon the North Atlantic coast certain expert heads of departments of the municipal government have given their assistance in certain portions of the investigation we have pursued evinces the ability of the departments to extend to the State and National Board of Health such co-operation as may be called for. There may be certain kinds of information and research occasionally required which municipal departments cannot supply. There will certainly be occasions for invoking such information and research by State and national aid.

Public works, especially for draining, sewering, public water supply, water-front protection, dredging, and civic cleansing, have assumed greatest efficiency and competeness in the cities of Boston and Providence, and would assume equal efficiency in New York and Brooklyn and numerous other municipalities, were the departments unvexed by partisan behests. Expert heads of the various departments and branches of the public works and sanitary service have claims paramount to all political exigencies for support and defense of their positions in the public service.

The plans and policy in the public works and public health departments seem too frequently to have been hasty and immature; and if any one branch of the State public service is more concerned and competent than another to foresee, devise, and have continually under consideration the most important and prudent plans and a steadfast and beneficent policy in regard to the public works that directly affect public health interests, the State board of health would justly claim such pre-eminence in this regard. The water supplies, sewerage, and drainage of cities and towns, and the sanitary improvement of ports, call for expert sanitary counselors. In every port and city we witness proof of this.

SANITARY DEFENSES—QUARANTINE.

The entire separation of the sick with infectious and contagious disease, and a prompt isolation or the destruction of infected and disease-propagating material, has become a public health duty, as sanitary science has advanced to practical conclusions in these few past years. The essential basis and reasons for any law or practice in the nature of quarantine restrictions are fully exemplified in the methods adopted by physicians and local health officers in the regulations they prescribe for the separation of the sick with infectious disease away from the presence of other persons, and the complete insulation and disinfection of whatever materials are believed to be infected. Quarantine has ceased to have any other significance than such separation and purification. What are reported as neglects of quarantine laws and the superseding of former practices in matters of quarantine signify that rational methods are being substituted for empirical or arbitrary regulations. The term disinfection and sanitary cleansing might well be substituted for that of quarantine.

In each of the maritime States and cities there are quarantine laws, based primarily upon the presumption that summary authority must, under various circumstances, be exercised to the extent of suspending intercourse and commerce for reasons which local or State authorities shall declare to be necessary. In no State has the State board of health been made responsible for the expert judgments by which the quarantine laws shall be applied, and in none of the eight States I have visited this year have I found the quarantine laws so modified as to provide adequately for the substitution and suitable application of the more effectual and rational means of sanitary inspection, disinfection and purification of infected vessels and materials, in which the affairs of commerce as well as the interests of public health are concerned. There is urgent necessity for such a review of the statutes and municipal regulations and methods relating to quarantines and the sanitary proceedings for suppression of portable contagia and the carriers and sources of pestilent infection, as shall result in suggesting and aiding the State and municipal authorities to revise their laws and regulations for protection against these evils.

We are warranted in concluding that there is already a recognized necessity for an inter-state and national concensus of the evidence and practical conclusions upon which any considerable amendments and enactments of law relating to quarantines and the carriers of pestilent infections shall be based, and it must be even more important that international conference and the latest and most indisputable verdicts of sanitary science and largest experience concerning this department of State hygiene should be secured as a condition antecedent to the efforts for a general reform of the laws and sanitary administration relating to this subject. The leading of the National Board of Health to secure such international conference and such a preliminary concensus among the States of the Union is recommended, and it certainly is desirable as well as practicable so far as the States of the northern Atlantic coast are concerned.

Local sanitary defenses of the northern ports and cities, as shown in this report, require increased official attention to the following particulars:

1. Sanitary inspection by expert medical officers and competent aids.
2. Thoroughness and system in the official study of preventable causes of mortality.
3. The registration and methodical sanitary care of infectious diseases through the co-operation of medical practitioners.
4. The undrained grounds in the cities.

The definition and practical description of a clean and of a foul and unclean ship or other vessel should never be indefinite; nor should any of the proceedings and methods by which a foul vessel is officially cleansed and her release granted by sanitary authority be in any respect indefinite or insufficient. The National Board of Health can usefully promulgate the best definition and methods, and give form to the best advice and rules upon this subject. In like manner the sanitary architecture and supervision of vessels may be most favorably influenced by the board.

The general and specific defenses of the ports of the nation which are necessary for the protection of national health will, upon the northern Atlantic coast, relate chiefly to the sanitation of the water fronts of the ports themselves and the improved sanitary construction and supervision of vessels; and in all of these means of general protection of the public health there are cogent reasons for seeking the aid and counsel of the National Board of Health to investigate, plan, and otherwise assume the nation's part in the work of devising and giving effect and uniformity to the needed system of port and maritime hygiene.

RECOMMENDATIONS.

On every hand there is confessed to be such urgent necessity for definite knowledge of the causation of destructive diseases, both as respects their intricate processes of a pathological kind in the bodies of those who suffer them, as well the external conditions which should be understood and controlled, that this recognized need recommends itself to the National Board of Health for action on its part to meet a desire that has become national. The sources of danger to public health most universal and most frequently mentioned in the northern ports and cities are largely associated with sewerage and excremental filth, saturated and filth-sodden grounds, malarial districts, overcrowding in cities, foul ships, and the pestilential infections; and concerning these sources of damage and peril to public health local health officers and individual investigators, acting in limited fields and with limited resources, can make only partial and unsatisfactory advances towards those comprehensive conclusions which must now be attained in sanitary science. It is justly asserted by sanitary students and public men that the kinds of research now most needed can be organized on a comprehensive basis by the National Board of Health, and that by means of such organization and its methods the National Board can bring the best of all the individual and local efforts into effectual co-operation, and that such co-ordinated work is necessary to the best results. Therefore it is desired and recommended that the National Board should, if laws and means permit, organize comprehensive investigation into the nature and effects of unwholesome emanations from sewers and malarial grounds; the conditions under which the crowding of habitations and particular districts in great cities become dangerous to public health; the conditions and essentials for perfect drainage and sewerage, and sufficiently distant and guarded disposal of sewage and other excremental filth; the means for complete cleansing and disinfection of ships and the preparation of an efficient sanitary code for ships and other vessels; the preparation and advising of certain specific improvements in port hygiene with reference to the permanent sanitary improvement and protection of harbor fronts and the water sides of cities.

The specific investigations to be indicated under the foregoing general recommendations would relate to the protection of habitations of every class against sewer gases and unwholesome emanations from wet or foul grounds; the essential sanitary questions of sewer structures, sewer ventilation, and the distant outflow or innocuous disposal of sewage; scientific investigation of causes and nature of malaria, with reference to prevention; continued investigation of the nature and essential causes of yellow fever; exact determination of the kinds and conditions of isolation ("quarantine"), disinfection, cleansing, and ventilation which are required for protection against the infectious diseases. What is an infected ship, place, or thing? What are the conditions and means for complete disinfection? What improvement in naval construction and in the sanitary police of vessels should be recommended for their protection against endemic and infectious diseases? What sanitary inspection of vessels, after as well as before debarkation of cargo, should be recommended to all port and State sanitary authorities, and, for a like purpose, what should be the sanitary supervision and improvements of harbor fronts?

In concluding this report, it is my pleasure to mention the uniform courtesy of all persons whom I have consulted or whose aid I have sought in any inspection or inquiry. The several statements, charts, and diagrams that are here appended bear testimony to the great interest and the helpful spirit of the people in regard to the work and purposes of the National Board of Health.

Respectfully submitted.

ELISHA HARRIS.

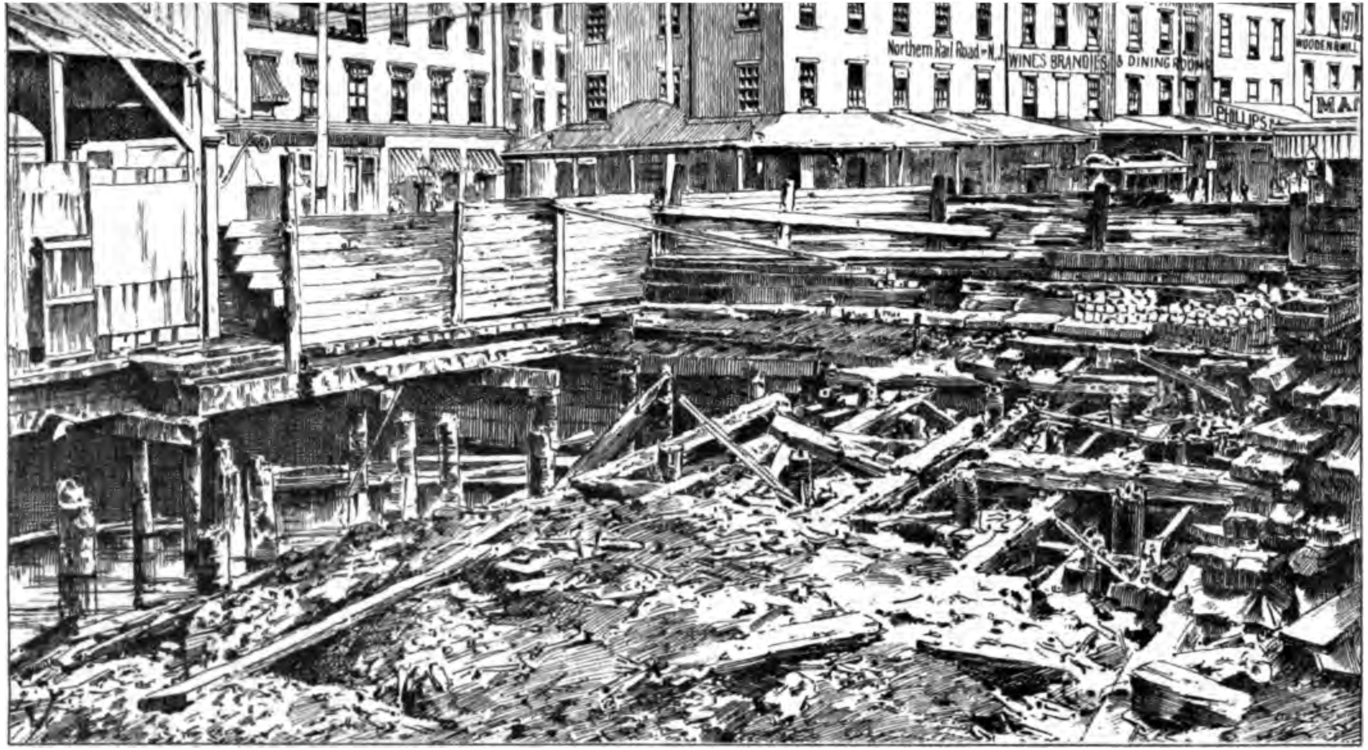
Schedule of sewers constructed in Providence.

	KIND AND LENGTH OF SEWER.														
	Pipe.				Circular brick.										
	8″	12″	15″	18″	16″	18″	20″	22″	24″	30″	36″	40″	48″	54″	66″
Sewers built in—															
1871		1, 828. 75	111. 00	46. 00											
1872		8, 253. 23	1, 402. 98	27. 00	455. 22	255. 40	245. 98	891. 13							
1873	219. 30	17, 602. 68	1, 819. 63	229. 55	2, 202. 39	1, 507. 18	2, 072. 00	813. 11	3. 00						1, 562. 60
1874		39, 199. 38	7, 220. 95	825. 71		3, 507. 32	1, 952. 41	672. 62	261. 89				1, 314. 70		
1875		33, 037. 28	4, 565. 00		1, 401. 45	4, 526. 74	3, 255. 68	3, 196. 32	895. 87						
1876		8, 680. 17	2, 418. 59			429. 38	1, 781. 48	255. 13					293. 02	250. 00	2, 462. 95
1877		11, 902. 26	538. 90			361. 90		1, 663. 30	284. 74	349. 17	195. 80	568. 25	100. 00		
1878		7, 787. 95	1, 763. 10				371. 72	132. 83	483. 50						
Total	219. 30	128, 291. 70	19, 840. 15	1, 128. 26	4, 059. 06	10, 587. 92	9, 679. 27	7, 624. 44	1, 929. 00	349. 17	195. 80	568. 25	1, 707. 72	250. 00	4, 025. 55

	KIND AND LENGTH OF SEWER.														½ catch-basins.	Catch-basins.	Man-holes.	Lamp-holes.	House connections.	Total length of sewer.	Cost.
	Oval brick.																				
	16 x 24	18 x 26	20 x 30	22 x 33	24 x 36	26 x 39	28 x 42	30 x 45	32 x 48	34 x 51	36 x 54	38 x 57	40 x 60	66 x 72							
Sewers built in—																					
1871	482. 00			1, 412. 89			1, 599. 11			594. 50						71	34		28	6, 074. 25	$40, 053. 69
1872						242. 48										83	115		39	11, 773. 42	61, 977. 53
1873			435. 17		1, 537. 66	374. 97					3, 095. 33	495. 20	2, 354. 46		1	281	346		261	36, 324. 23	332. 006. 56
1874			3, 187. 27	1, 217. 79	631. 29	984. 70	2, 190. 67	98. 00	410. 85						3	508	700	19	522	63, 675. 55	439, 390. 04
1875			993. 40	1, 070. 21	2, 181. 40										10	380	613	91	576	55, 123. 35	274, 203. 72
1876			1, 628. 92	1, 268. 42	368. 80			2, 170. 35				2, 395. 95			2	144	233	34	449	24, 403. 16	154, 757. 96
1877								647. 78						530. 64	2	128	163	12	383	17, 142. 74	46, 127. 72
1878		142. 00		70. 70												108	110	4	308	10, 751. 80	39, 693. 90
Total	482. 00	142. 00	6, 244. 76	5, 040. 01	4, 719. 15	1, 602. 15	3, 789. 78	2, 916. 13	410. 85	594. 50	3, 095. 33	2, 891. 15	2, 354. 46	530. 64	18	1, 703	2, 314	160	2, 566	225, 268. 50	1, 388, 211. 12

Schedule of sewers constructed in Providence.

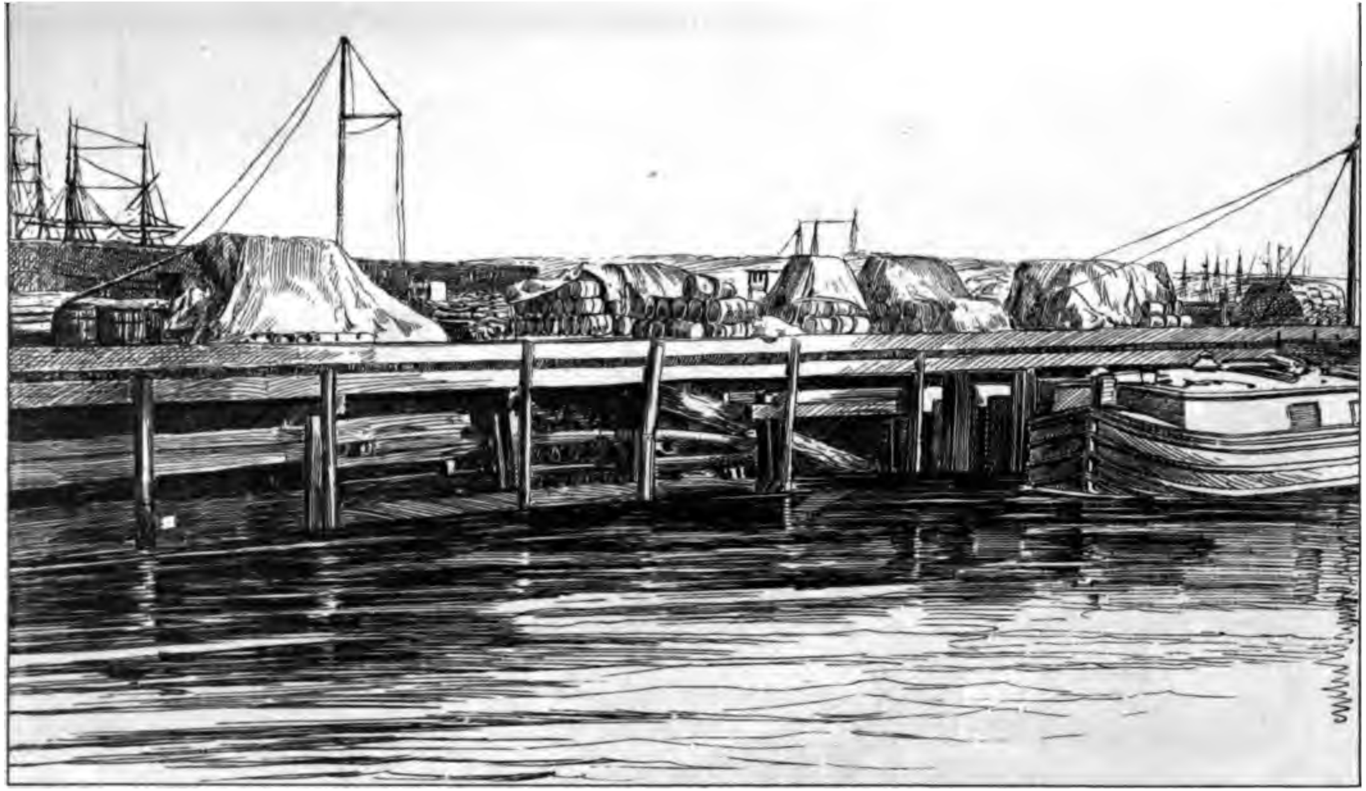
2



OLD CRIBS AND CRIB BULKHEADS UNCOVERED.

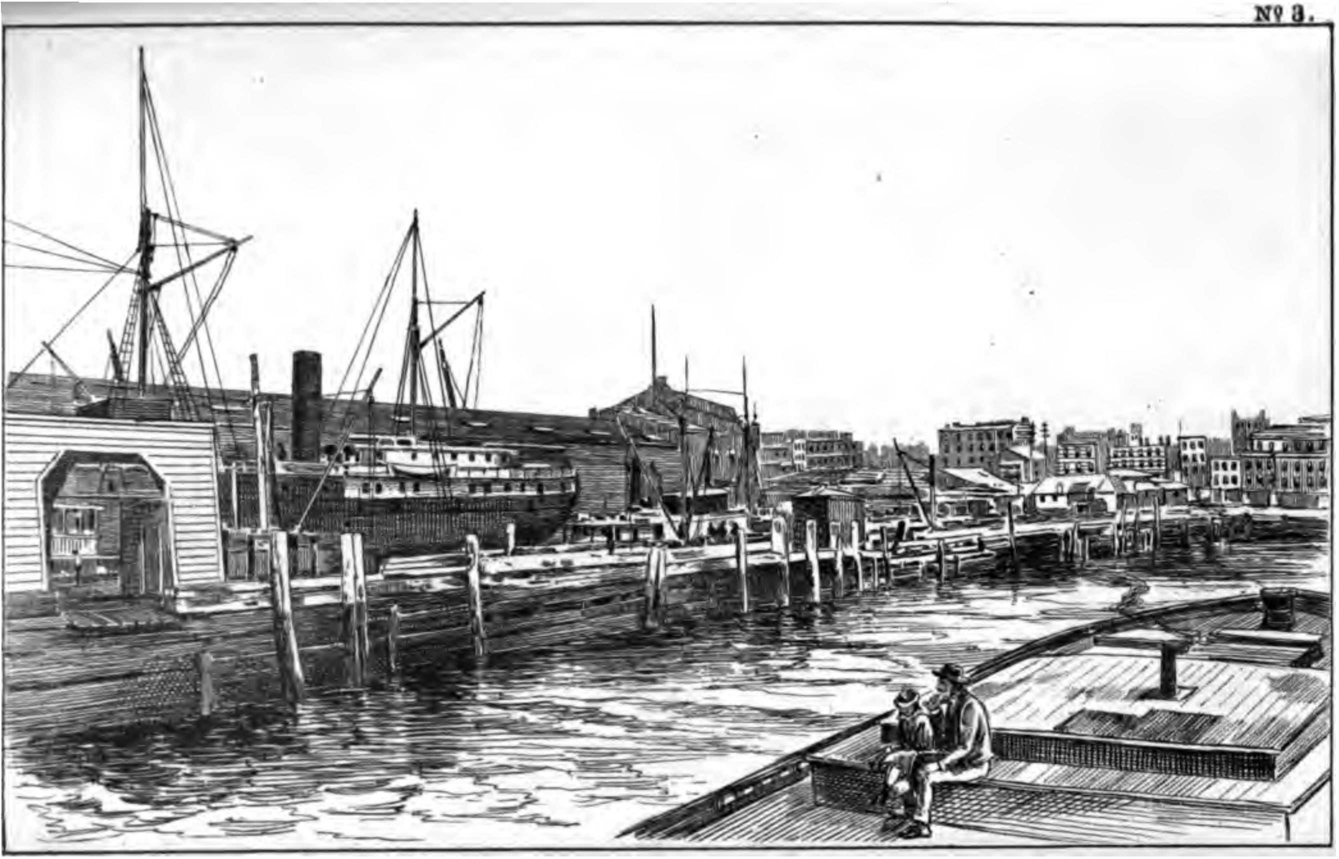
Foot of Chambers St., North River.

From Photograph by C. W. RAYMOND. August. 1879.



OLD CRIB UNDER INNER END OF PIER 6, EAST RIVER.
Foot of Coenties Slip.
From Photograph by C. W. RAYMOND, August. 1879.

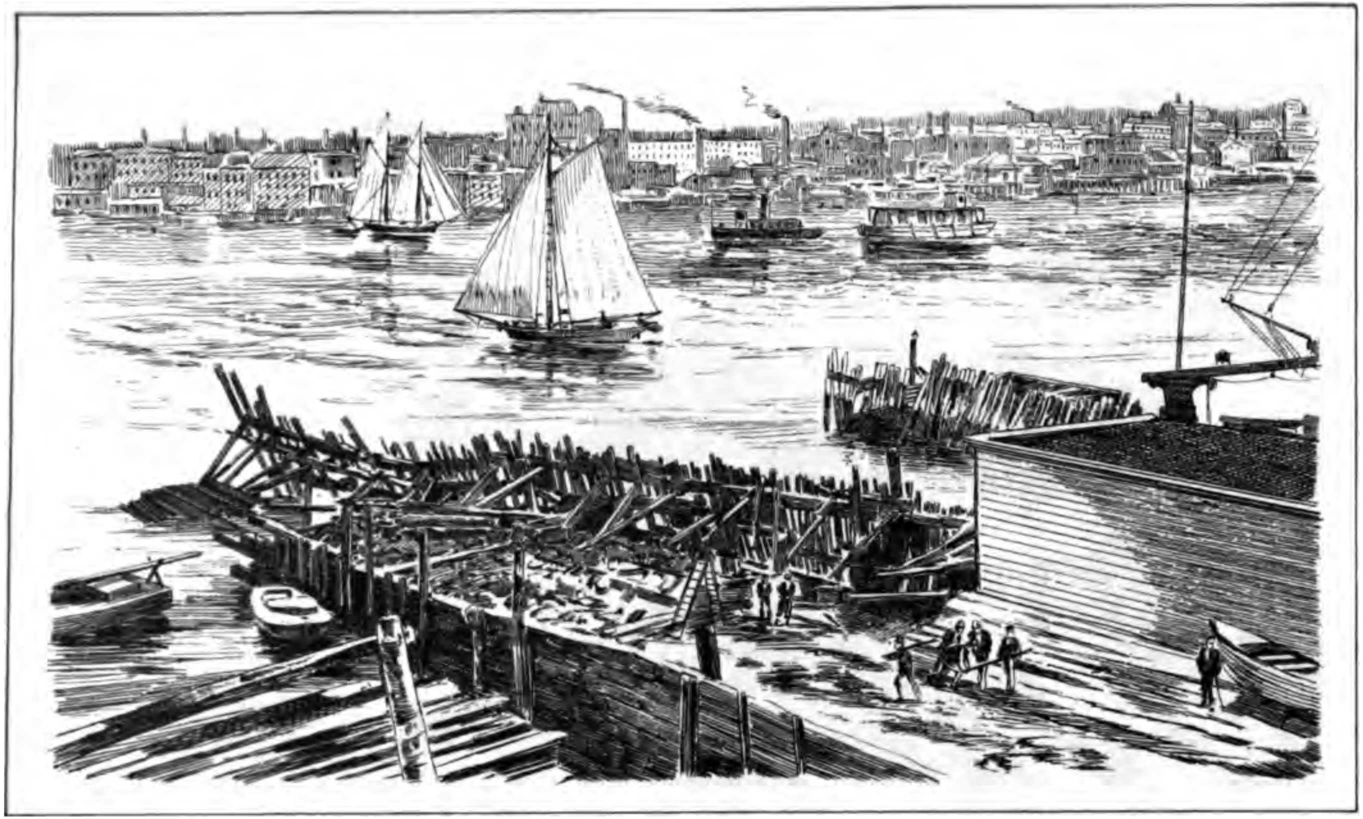
Nº 3.



OLD CRIB PIER No. 42. NORTH RIVER.

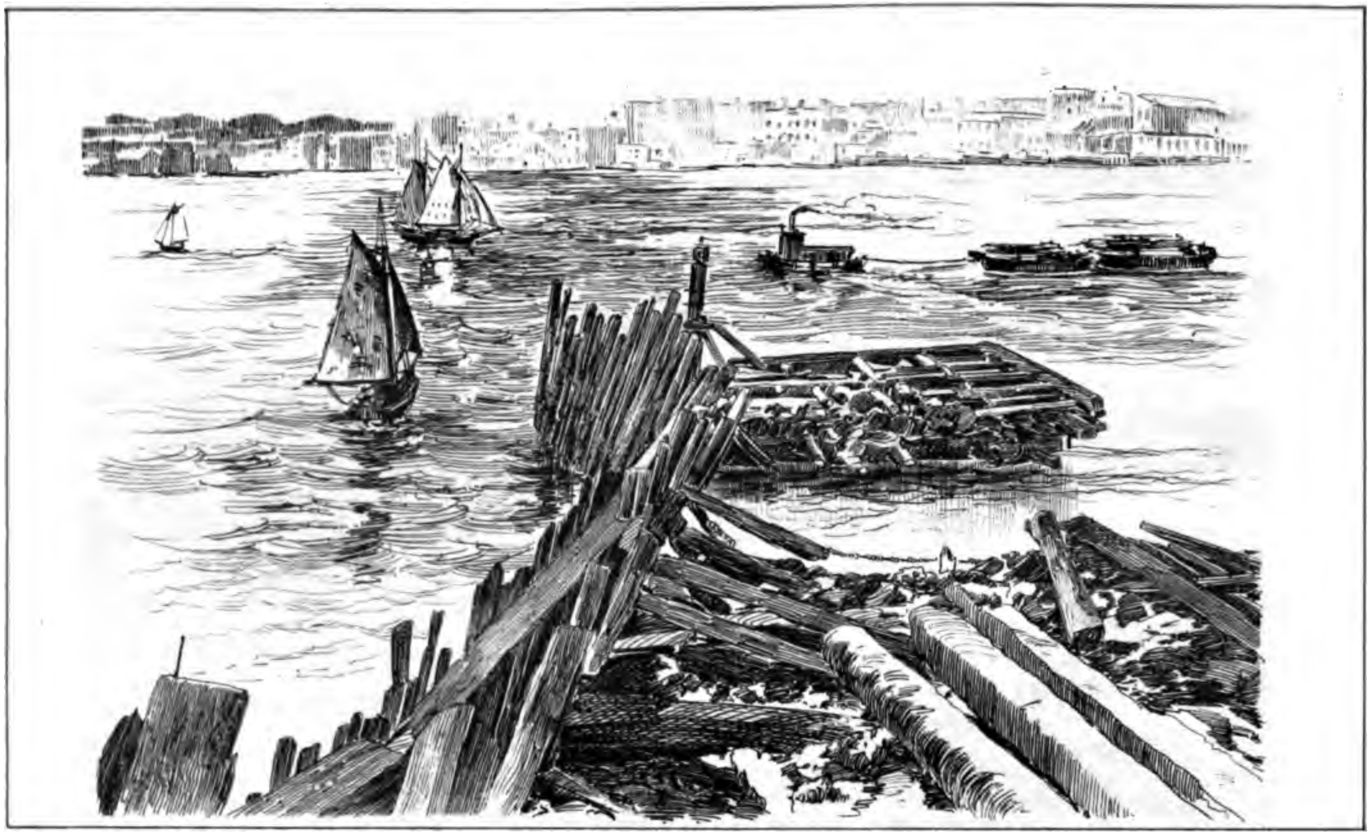
From Photograph by C. W. RAYMOND. August. 1879.

N? 4.



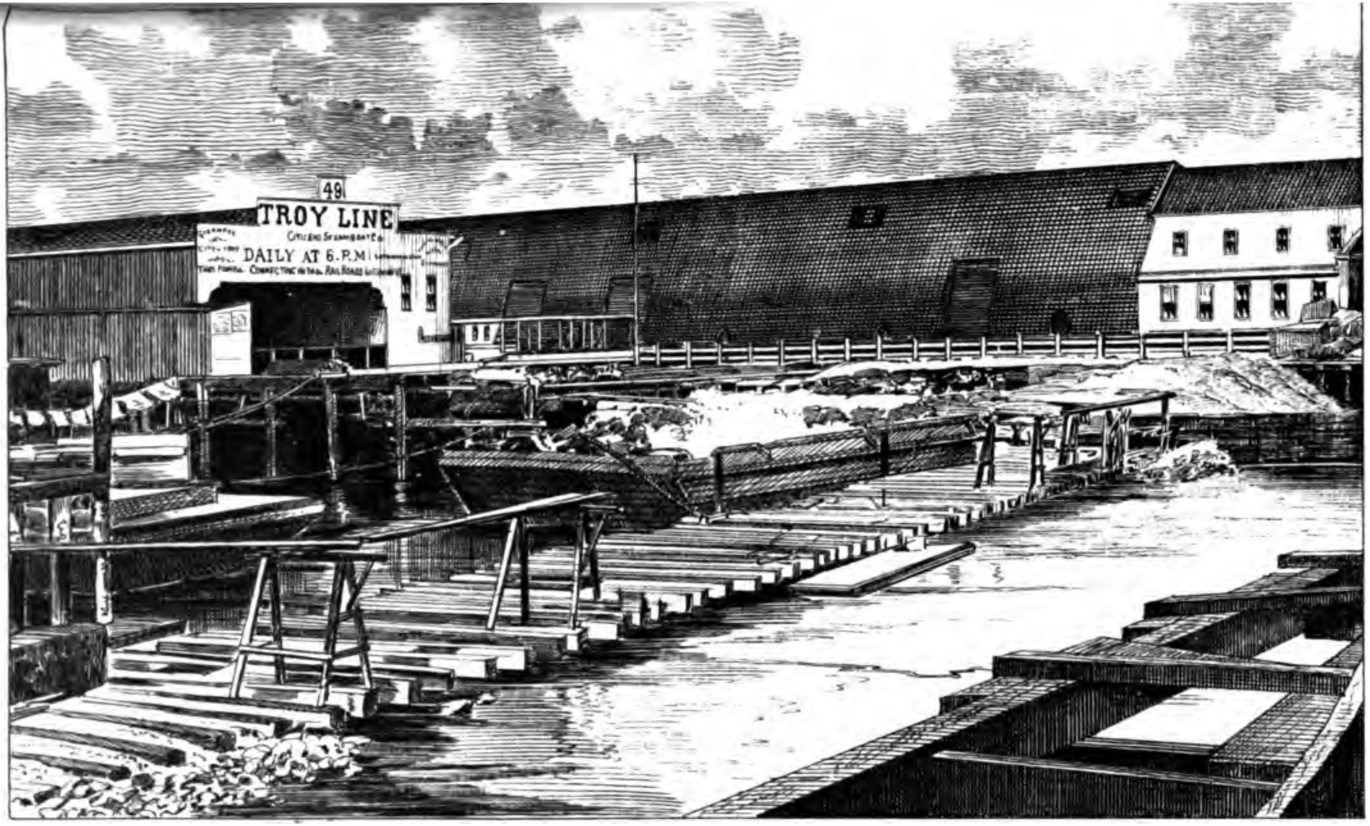
OLD CRIB PIERS IN RUINS. Jackson St. (East River) Ferry in 1870 (Now Removed).

N° 5.



OLD CRIB PIERS IN RUINS.

Jackson St. (East River) Ferry in 1870 (Now Removed).

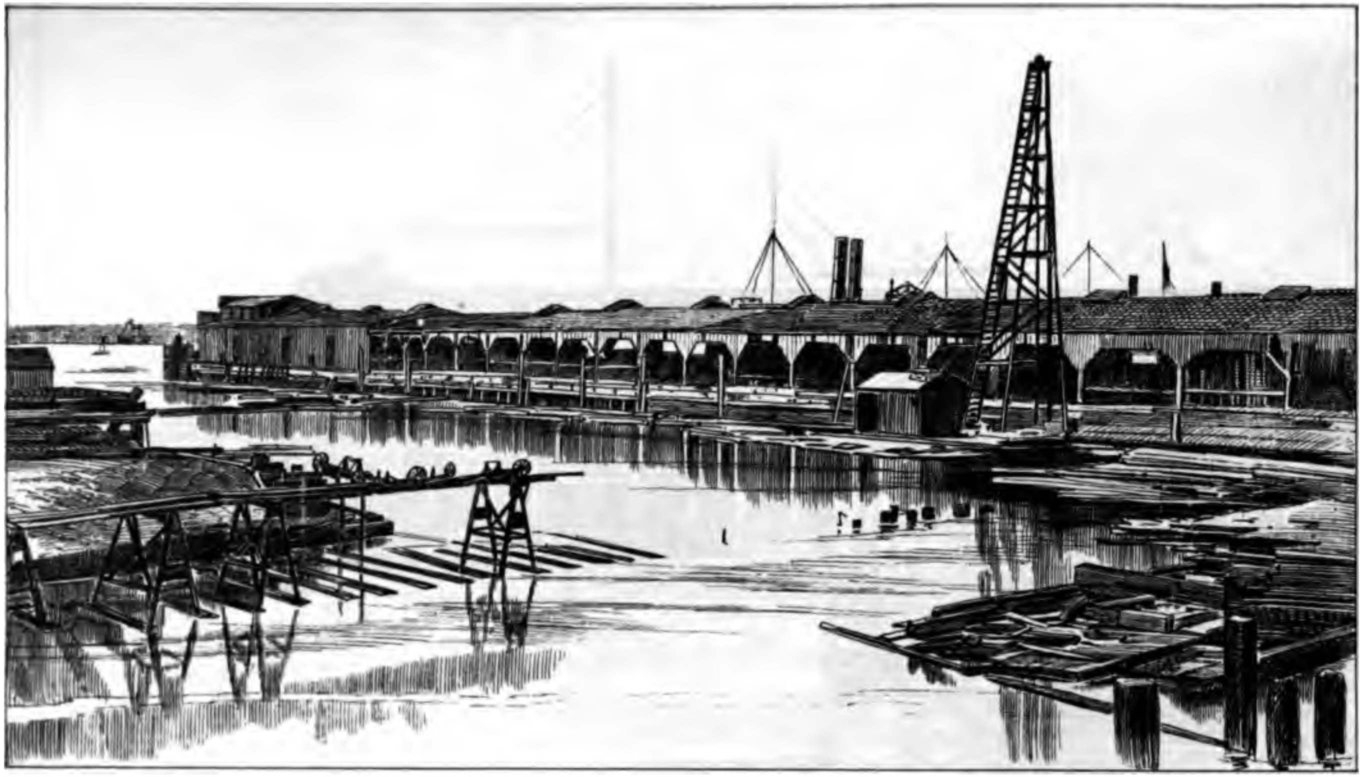

49
TROY LINE
Citizens Steamboat Co.
DAILY AT 6. P.M.

SHOWING FOUNDATION OF NEW BULKHEAD, 180 FEET IN FRONT OF OLD ONE.

Also, a Side View of Pier (old No.) 49, and Shed on Pier (new No.) 42 (old No. 50).

From Photograph by C. W. RAYMOND, August, 1879.

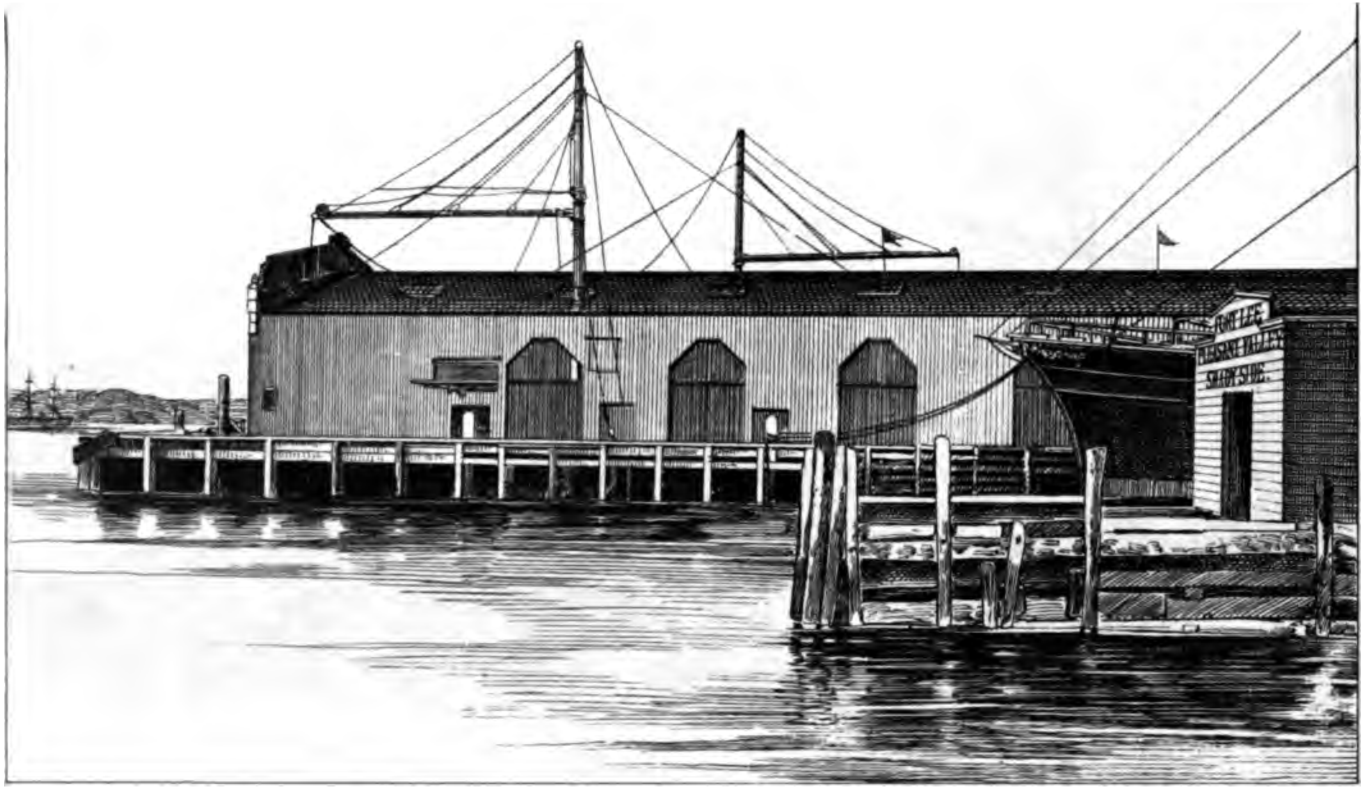
Nº 7.



Pier (old No.) 31. North River (Crib and Close. Pile. Sub-structure). and New Bulkhead Wall in process of construction by the Department of Docks. N. Y. City.

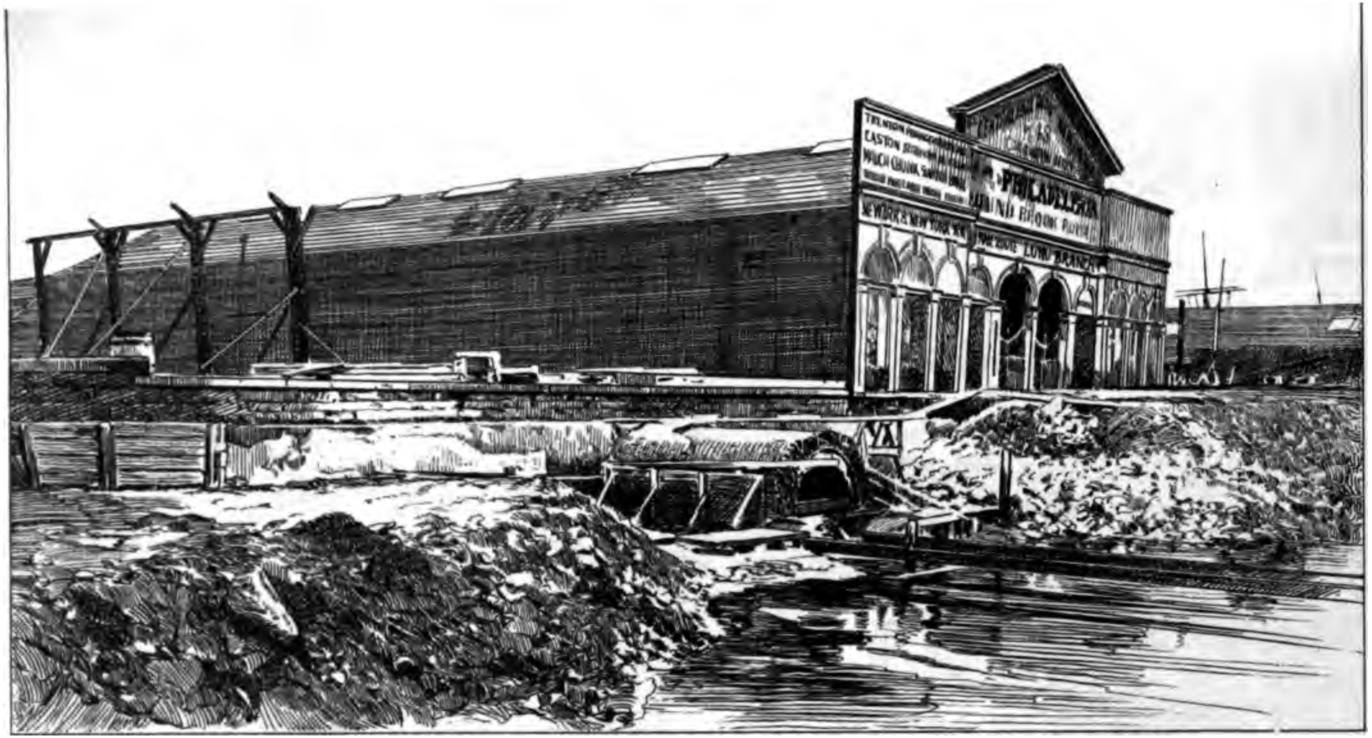
New Wall is about 180 feet further out in river than old bulkhead.

From Photograph by C. W. RAYMOND. August. 1879.



Outer Ends of Piers (old No.) 42 and (new No.) 34, foot of Canal St., North River, comparing Crib-work and Open-work under Old and New Piers.

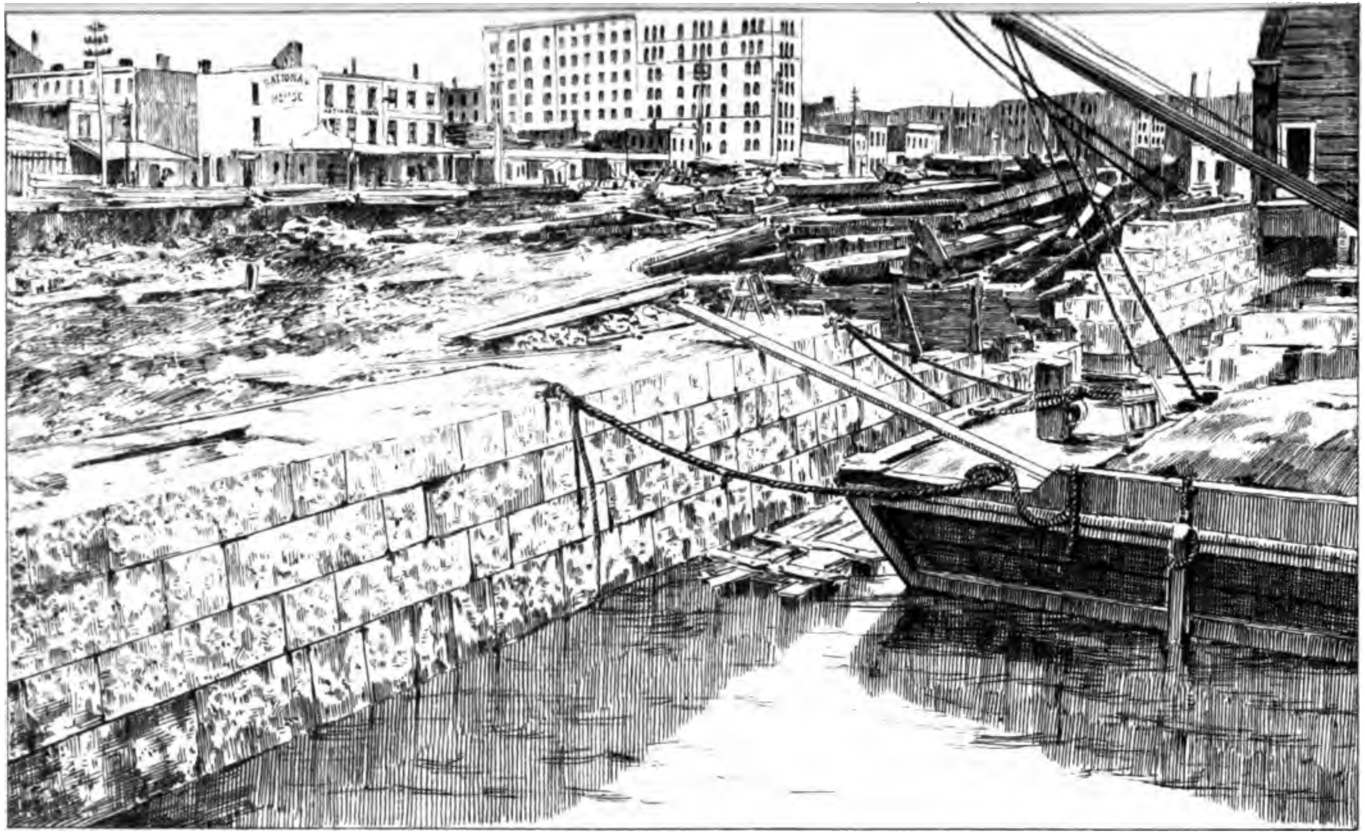
From Photograph by C. W. RAYMOND. August, 1879.



Showing Communipaw Ferry Shed and Large Brick Sewer (uncompleted), foot of Clarkson St., North River, built through wall, under and to outer end of Pier (new No.) 40, discharging in deep water. Sewer, 9 ft. 6 in. by 5 ft. 6 in. (inside).

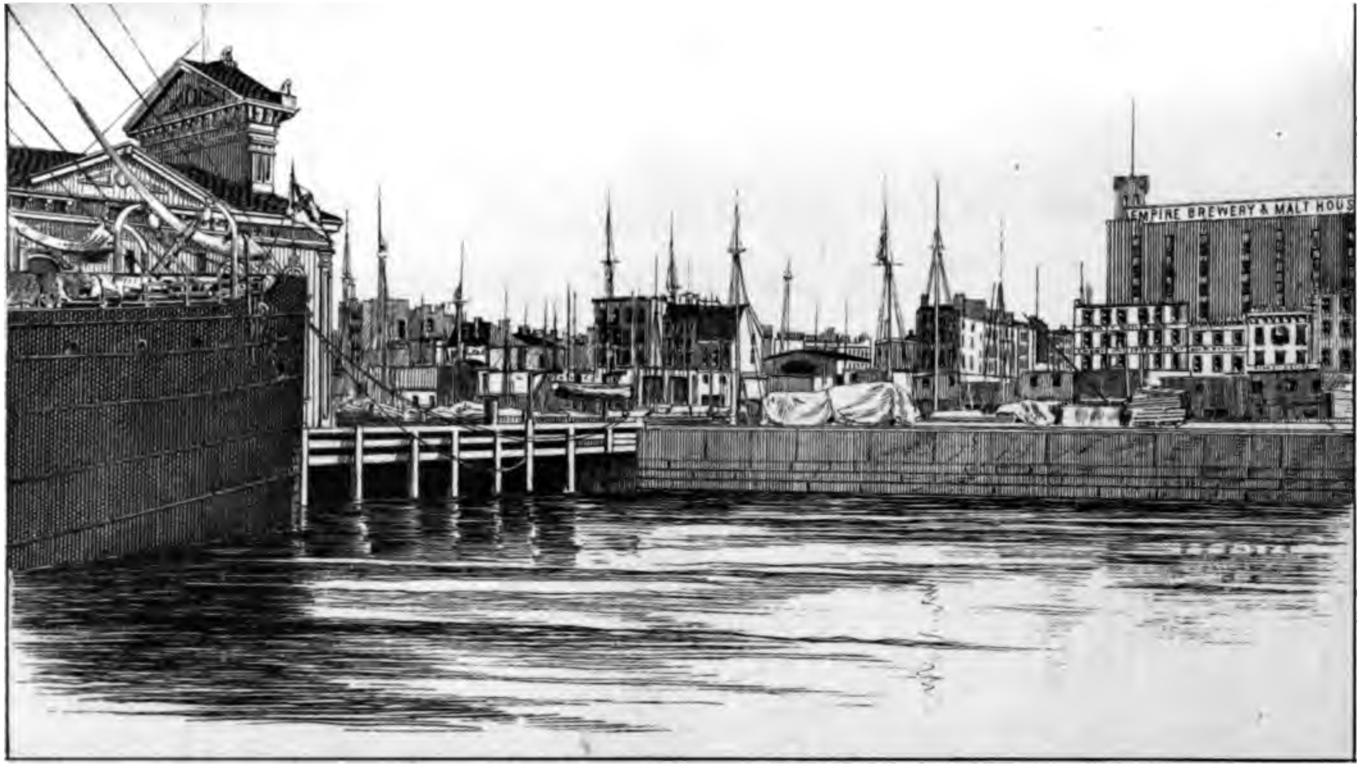
See Diagrams of New Dock and the Sectional Views of Outfall of Sewer at foot of Clarkson St.

From Photograph by C. W. RAYMOND, March, 1879.



Showing Face of New Bulkhead Wall (coping not set) between Piers 39 and 40 (new Nos.), looking south from inner end of Pier 40, North River.

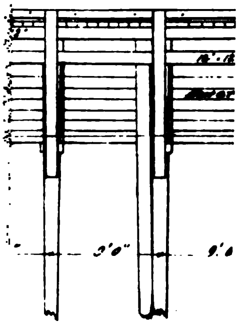
From Photograph by C. W. RAYMOND, April, 1879.



Bulkhead or River Wall between Piers (new Nos.) 45 and 46, foot of 10th St. and Charles St., North River.

From Photograph by C. W. RAYMOND. August, 1879.

3



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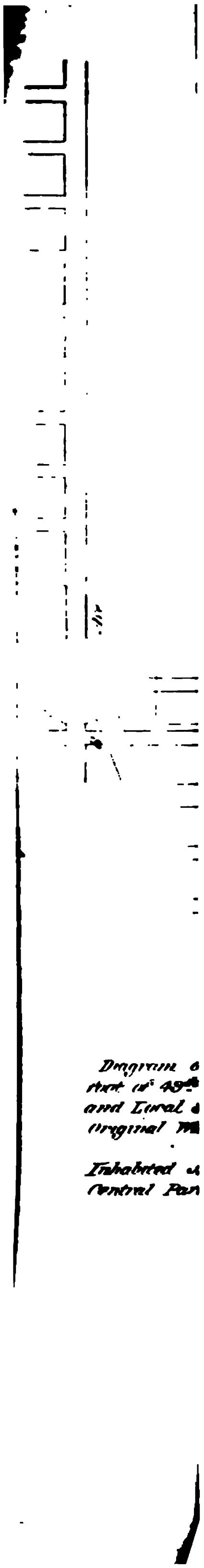
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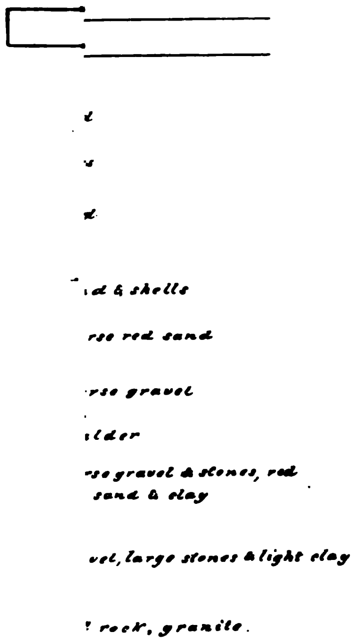
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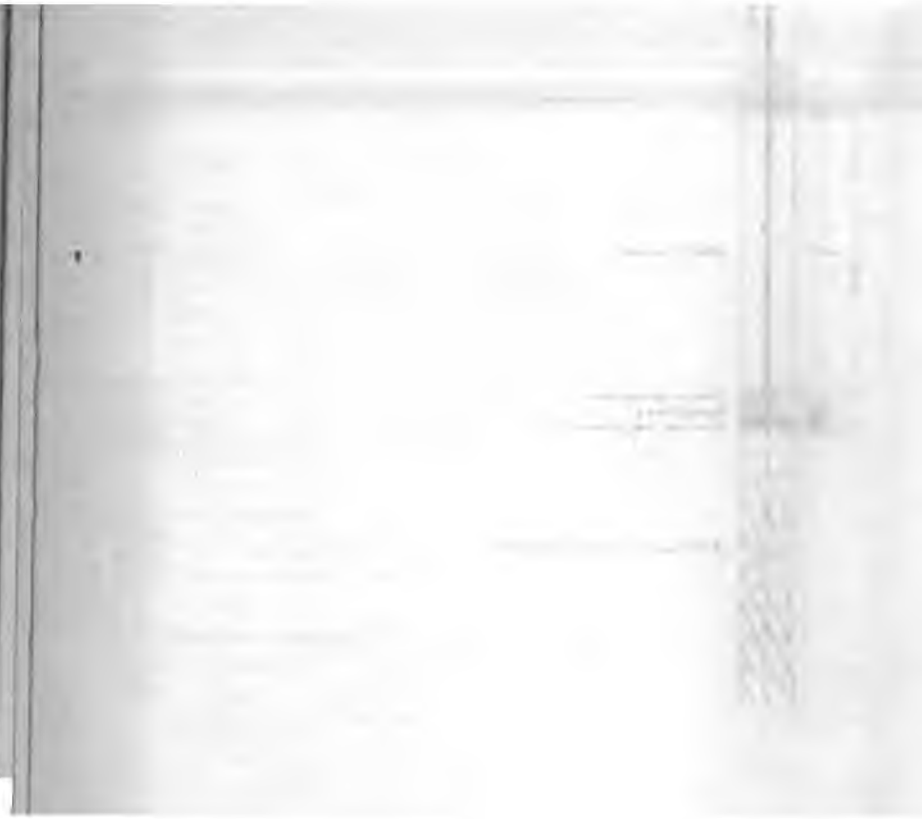

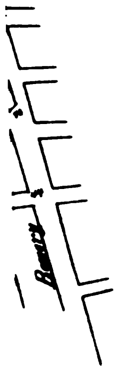
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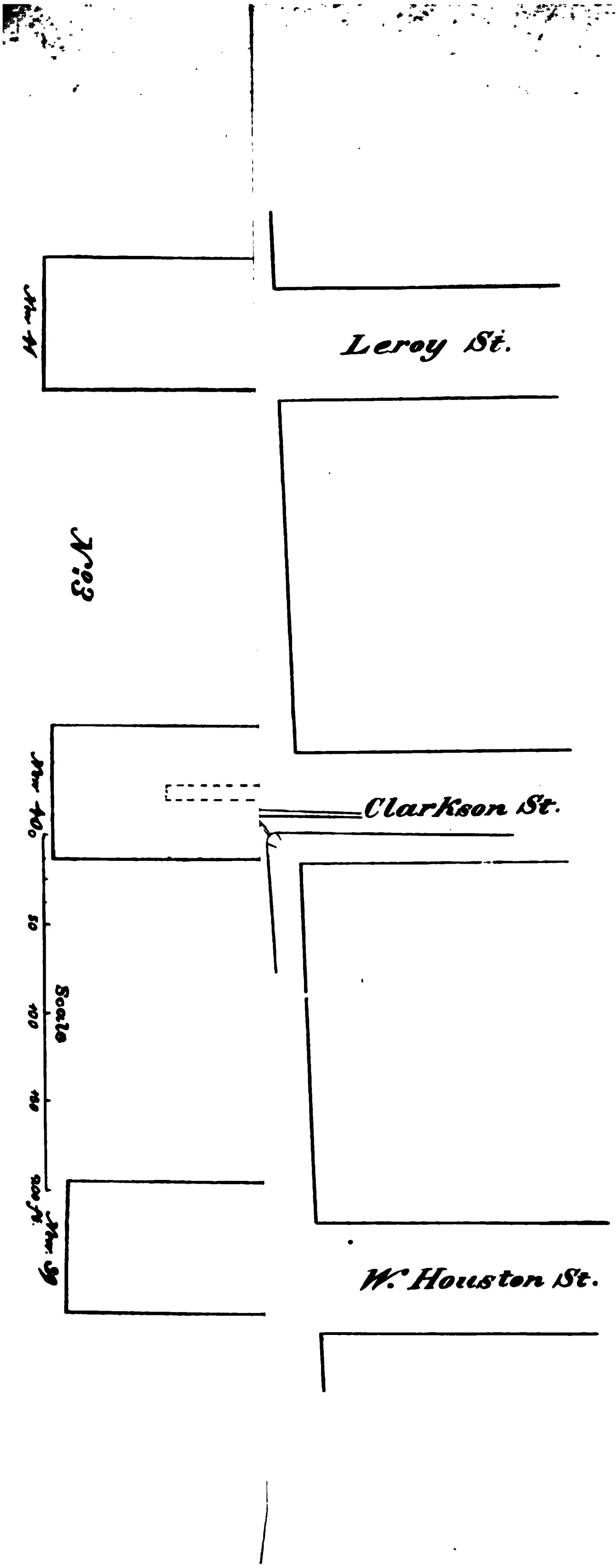
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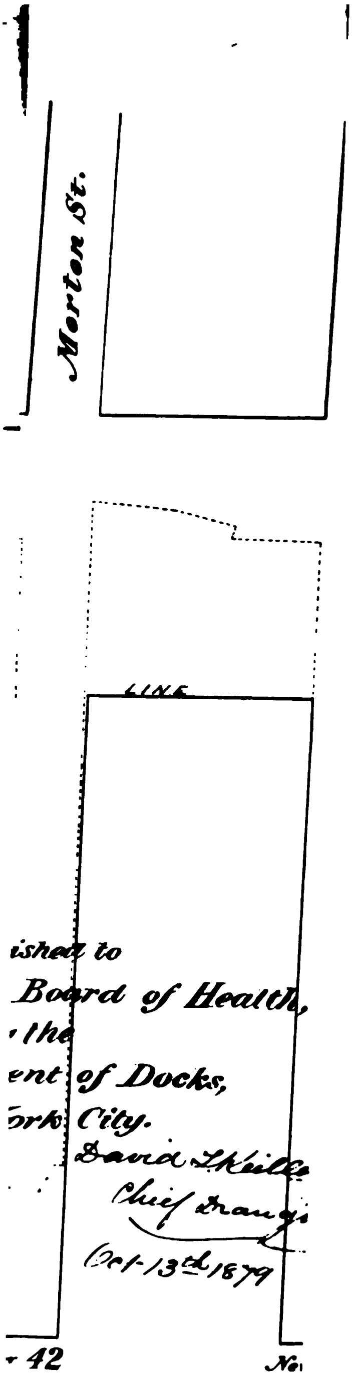

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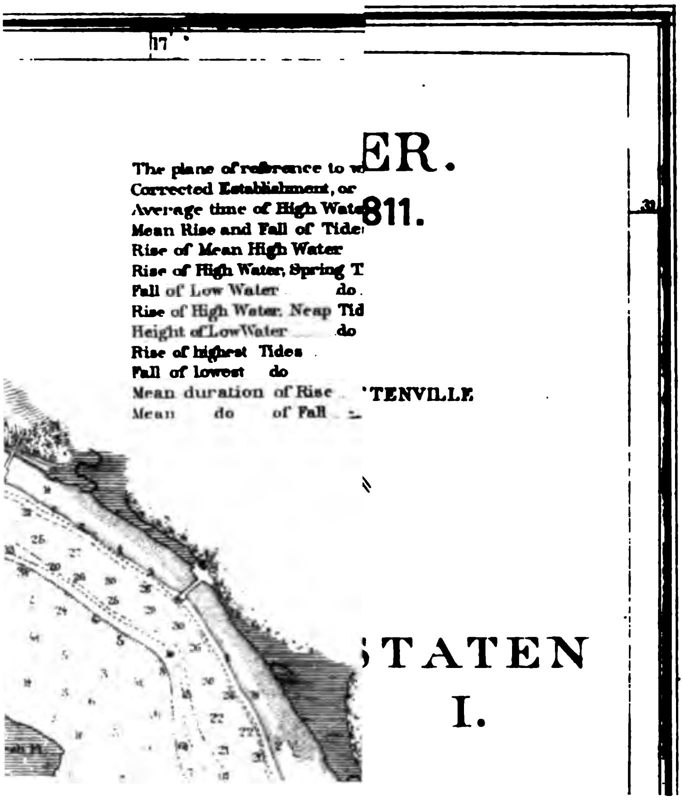

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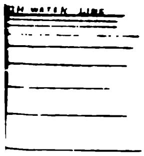

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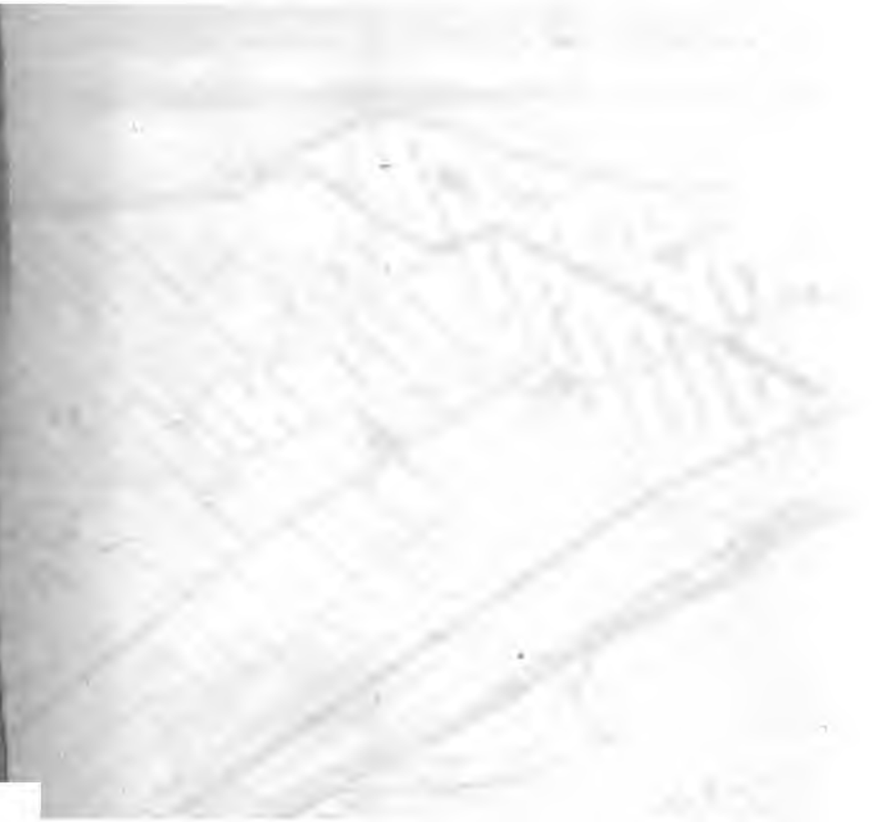

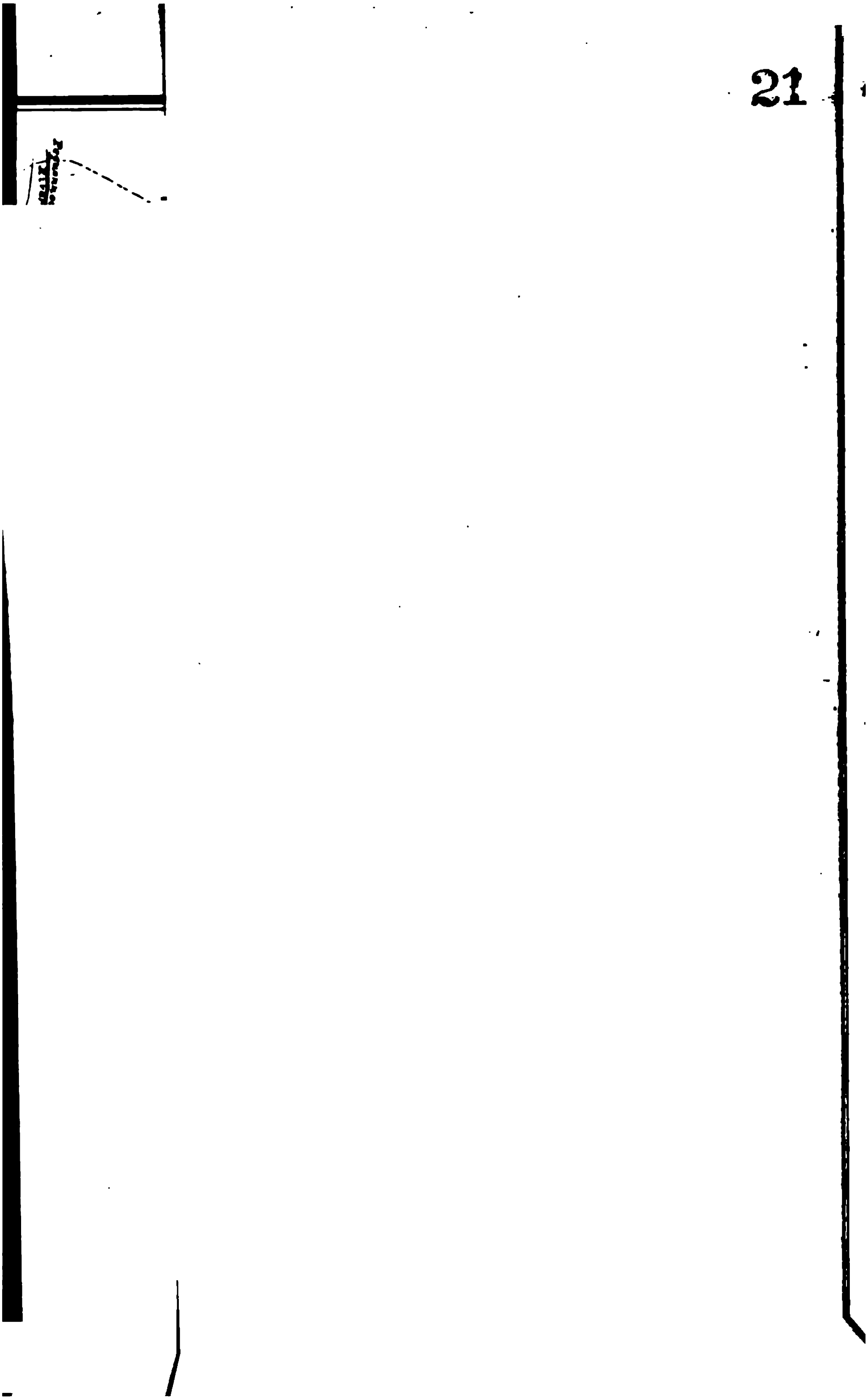

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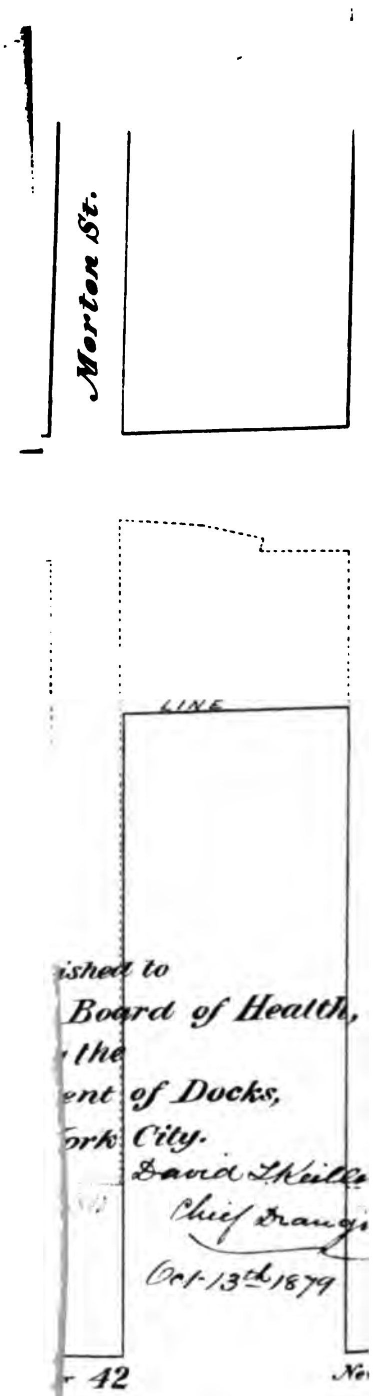
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CHESTER, PA., *June* 2, 1879.

DEAR SIR: I have just completed a very satisfactory inspection of the Philadelphia quarantine near here. General Addicks and Dr. Robinson have rendered me every assistance possible. I shall move on to Baltimore this morning, where my address will be Carrollton House.

Very respectfully, your obedient servant,

E. M. WIGHT,
Quarantine Inspector.

Dr. THOS. J. TURNER,
Secretary National Board of Health, Washington, D. C.

WASHINGTON, D. C., *June* 4, 1879.

DEAR SIR: I hand you inclosed some little abstracts of rules and regulations relating to quarantine, which, if you have not already had access to, will be of service to Dr. Johnson's committee on rules.

Please preserve the papers, to be forwarded to me when you are through with them, or keep on file where I can get at them for final report purposes.

Yours, very respectfully,

E. M. WIGHT.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

TENNESSEE STATE BOARD OF HEALTH,
Chattanooga, June 7, 1879.

DEAR SIR: The inclosed communication from Dr. W. T. Robinson, lazaretto physician, relates to a matter of much consequence. Complaint was made to me, and will form a part of my report, at Baltimore upon the same subject. I met these runners or "river drummers" upon several occasions when boarding vessels, they having already boarded the ship before her arrival at the quarantine boarding station.

Yours, very respectfully,

E. M. WIGHT,
Quarantine Inspector.

Dr. THOS. J. TURNER,
Secretary National Board of Health, Washington, D. C.

PORT OF PHILADELPHIA, *June* 3, 1879.

SIR: I have the honor to call the attention of the National Board of Health to a violation of the quarantine regulations of this port, which, occurring as it does beyond the jurisdiction of the local quarantine, and on that portion of the river Delaware in which the United States has jurisdiction, is a case peculiarly proper for the interference of the United States authorities through the National Board of Health.

This is the visitation of vessels below quarantine grounds by the runners of business houses of Philadelphia in row-boats and in the steam-tugs, which do the towing from the capes to the city. That these runners go aboard these vessels I am certain, because I find the business cards of the Philadelphia houses which they represent on the tables of the captains' cabins. When passing quarantine the boats are found in tow of the vessels, sometimes three or four boats towing after a ship at the same time; and so great is business competition, that no sooner does one tug leave the vessel than they are all emptied on the ship, soliciting business for boarding-houses, stevedores, brokers, ship-chandlers, and others. This is, of course, in violation of Treasury regulations also.

These runners reside in that portion of the city which is low, ill-ventilated, uncleanly, and peculiarly liable to infection, to which, in some cases, these men expose themselves in their business zeal.

As the health laws of the port are thus violated, as well as the Treasury regulations of the United States, I have the honor to recommend that the National Board of Health forbid all such practices, and authorize the captain of the revenue cutter at this port (the Hamilton) to arrest all such parties and give them a hearing before the United States commissioner of this city.

Very respectfully, your obedient servant,

W. F. ROBINSON,
Lazaretto Physician and Quarantine Officer, Port of Philadelphia, Pa.

Dr. WIGHT,
Quarantine Inspector, National Board of Health, Washington, D. C.

PHILADELPHIA, *July* 25, 1879.

SIR: I am directed by the board of health to transmit to you the following copy preambles and resolutions passed this date.

Respectfully, yours, &c.,

F. WM. P. TROTH,
Chief Clerk.

ALEXANDER P. TUTTON, Esq.,
Collector of the Port of Philadelphia.

Whereas it is the custom of boarding-house runners and others to go on board vessels at the Breakwater, or during the passage of said vessels up the Delawa River, and said communication may endanger the public health;

And whereas in the thirteenth section of the act of assembly constituting an authorizing the present board of health, the following words occur:

" * * * * if any master or commander * * * shall suffer any person, excep the pilot, to come on board before such examination (meaning the examination of t quarantine physician and master) be duly had and certificate obtained, as is herei after specified, the person or persons so permitting, and the person or persons so lande or going on board (unless imminent danger of the loss of the vessel or lives of the cre shall render assistance necessary), being thereof convicted upon indictment or pros cution under this act by verdict, confession, or standing mute, in any court havin jurisdiction of the offense, shall pay a fine not exceeding five hundred dollars, to b recovered and appropriated as in here directed";

"And whereas the enforcement of this part of the act presents certain difficultie be it

"*Resolved*, That the board ask the aid of the collector of customs of this port an other United States officials in carrying out the provisions of the above law.

Resolved, That a copy of the above preamble and resolution be sent to the collecto of the port of Philadelphia.

PHILADELPHIA, PA., *July* 26, 1879.

SIR: I have the honor to inclose herewith a communication from the board of healt of this city requesting assistance from the general government in enforcing the loca quarantine regulations and laws.

It is the custom, as stated in said communication, for boarding-house runners an others to go on board vessels and leave them again between the breakwater and quar antine, and then come direct to the city in boats or tugs, thus greatly endangerin the health of the city.

Section 3 of the act of Congress dated June 2, 1879, provides that the National Boar of Health shall co-operate with and, so far as it lawfully may, aid State and municip boards of health in the execution and enforcement of the rules and regulations of such boards, &c. And section 7 of said act of Congress provides that the President i authorized, when requested by the National Board of Health and when the same ca be done without prejudice to the public service, to detail officers from the sever departments of the government to act under the direction of the said board, &c.

Taking these two sections of the act of June last together, I presume that the President would be authorized, at the request of the National Board of Health, to direct me, as collector of this port, to instruct Captain Irish, of the revenue steamer Hamilton, that, in addition to the ordinary duties of his vessel and crew, he should employ then in preventing persons from boarding and leaving vessels between the breakwater and quarantine station on the Delaware River, or in arresting and delivering to the board of health of this city those who persist in doing so.

Should this proposition meet with your approval, please refer the same to the Nationa Board of Health for their action.

I believe the mere issuing of such an order by the President and the publishing thereof in our local papers as a matter of news will wholly stop the nuisance complained of.

I am, sir, very respectfully,

A. P. TUTTON,
Collector.

HON. JOHN SHERMAN,
Secretary of the Treasury, Washington, D. C.

TREASURY DEPARTMENT,
Washington, D. C., July 29, 1879.

SIR: The department is in receipt of your letter of the 26th instant, inclosing one from the Philadelphia board of health in relation to emigrant runners and others boarding vessels after their arrival at the breakwater and before they reach the quarantine; which action is in violation of the quarantine laws governing your city.

You suggest that the matter be referred to the National Board of Health, in order that that body may procure from the President authority for you to require the officers of the revenue cutter now stationed at Philadelphia to aid in breaking up the evil complained of.

In regard thereto, you are informed that section 4792 of the Revised Statutes provides that the quarantine and other restraints established by the health laws of any State, respecting any vessels arriving at or bound to any port or district thereof, shall be duly observed by the officers of the customs revenue of the United States, by the masters and crews of the several revenue-cutters, * * * and all such officers of the United States shall faithfully aid in the execution of such quarantines and health laws, according to their respective powers and within their respective precincts, and as they shall be directed, from time to time, by the Secretary of the Treasury.

By this you will see that it is by law expressly made the duty of the officers of the revenue cutters to aid in the enforcement of said quarantine laws, so that a reference of the matter to the National Board of Health and the President is unnecessary to accomplish the desired end. A special letter will be addressed to the captain of the revenue cutter Hamilton, directing him to give all the aid in his power to stop the objectionable practice before mentioned.

Very respectfully,

J. B. HAWLEY,
Acting Secretary.

COLLECTOR OF CUSTOMS,
Philadelphia.

CUSTOM-HOUSE, PHILADELPHIA, PA.,
Collector's Office, July 30, 1879.

SIR: Your letter of the 29th instant, in answer to mine of the 26th, transmitting a communication from the board of health of this city, asking assistance from the government in preventing persons from boarding and leaving vessels between the breakwater and quarantine, in which you call my attention to the provisions of section 4792 of the Revised Statutes, and stating that a special letter will be addressed by the Secretary to the captain of the revenue cutter Hamilton, directing him to give aid, &c., is received.

In reply I have to say that I was fully aware of the provisions of law you refer to, but they don't seem to me to cover this particular case, for the reason that our State and municipal quarantine laws and regulations extend only a few miles below quarantine station, the southern line of Pennsylvania, and from there to the breakwater, a distance of 70 or 80 miles, there are no local quarantine laws or regulations in effect, and within this distance it is that the evil complained of exists, and I do not see how, under the section to which you refer, Captain Irish can render any assistance in enforcing the quarantine laws in that territory, because there are none, *i. e.*, no State or local laws or regulations.

Hence it was that I called the attention of the department to section 3, act June 2 last, which provides that the National Board of Health shall co-operate with and aid State and municipal boards; shall also enforce quarantine regulations at such ports and places within the United States as have no such laws or regulations under the State authorities. Thus, it seems to me, the National Board of Health have authority to enforce quarantine restrictions on this territory between the breakwater and the Pennsylvania State line; and could, by co-operating with the board of health of this city, assist very materially in preventing the introduction of contagious and infectious diseases in the manner referred to. And by section 7 of the same act it would appear that if the National Board of Health take any action in the matter it would have to be done through an order of the President.

I respectfully submit this phase of the case for your consideration.

I am, sir, very respectfully,

A. P. TUTTON, *Collector.*

Hon. JOHN SHERMAN,
Secretary of the Treasury, Washington, D. C.

and found it in manner and kind to be, so far as principles are involved, much like that of the port of New York, as above described. The lazaretto physician, who is the quarantine officer, and the quarantine master are required to board vessels together at this port. The quarantine master conducts in the main the sanitary inspection of the vessel, while the lazaretto physician inspects the crew, passengers, if there are any; makes the necessary examination to establish the sanitary condition of the port of departure, by the examining and taking up the bill of health; by administering an oath to the captain of the vessel to the effect that there was no contagious, infectious, or other suspicious disease at the port of departure at the time his vessel cleared, and that he has had no such disease on board his vessel during the voyage, and that, so far as he knows, his crew and passengers are all in good health. This examination having been completed and found satisfactory, the vessel is given "permission up," as it is styled at this port, and a report upon the condition of the vessel is forwarded to the health officer in the city.

No quarantine of observation is provided at this port, other than the retaining of those who are well on board the ships on which they arrive. All the sick are taken off, if sick with contagious or infectious diseases, and provided for in the proper hospital at or near the station; and those who are well are required to put the ship in good condition, and kept in quarantine until such a time has passed as to satisfy the health officer that there is no longer danger of disease on board the ship.

The quarantine at this port goes on on the 1st day of June, a month later than that of New York, and is continued until the 1st day of October, or as much longer as circumstances may require. The boarding fees are from $5 to $20, and the charges for the care of the sick are $1 per day. All these fees go to the city of Philadelphia, and are collected at the health office in the city. There is no lightering done at this port, and cargoes are sometimes discharged in quarantine at the wharf at the quarantine station.

PORT OF BALTIMORE.

This quarantine is a municipal establishment established by the city of Baltimore, and maintained by an appropriation of the city council yearly.

There is at this port but one boarding station, which is about six miles below the city, and is badly located for the purpose for which it is used. The city has contemplated a change of this station for some years; and consequently the station has been neglected as to its condition and repairs. It is, however, sufficient in capacity for the accommodation of about one hundred sick, and a large number of wall tents are kept stored at the station for use in case they should be required.

I witnessed the operation of boarding and inspection of vessels at this port, but had no opportunities to see fumigation and cleaning of vessels carried on; but from the account given by Dr. E. Lloyd Howard, who is the quarantine officer, styled "marine-hospital physician," I infer that the conduct of this quarantine is very similar to that of the ports of New York and Philadelphia, so far as its facilities will permit. They have no quarantine of observation other than to detain the well on board the ships on which they arrive; and if different diseases should occur at the same time they would, of necessity, be obliged to be placed in hospital at this same station, although they would be separated, as far as they could be, by means of hospital tents.

The period of detention of vessels supposed to be infected, as practiced here, is longer than at the port of New York. It is not uncommon, during the quarantine season at Baltimore, which extends from the 1st of May to the 1st of November, to detain a vessel from an infected port, or with contagious or infectious disease on board, for twenty or thirty days, during all of which time she is kept under close watch, and repeatedly fumigated, thoroughly aired and cleaned.

This constitutes a brief report of my work up to this day. In the prosecution of all my inquiries and examinations I have been extended every aid and facility that the health and quarantine authorities at the different ports could render.

The one principal difficulty that I have met with has been the lack of sources for information upon subjects relating to quarantine laws and rules regulating quarantine services at the different ports.

Each port carries on quarantine after a fashion peculiar to itself in a certain degree. All the quarantine authorities at the various points incline greatly to the conduct of quarantine upon principles rather than arbitrary rules. All likewise attach great importance to the sanitary care and condition of ships, both at the time of departure, during the voyage, and at the time of arrival.

Bills of health obtained at foreign ports are not given any very high degree of consideration and confidence; but at all these ports it is agreed that clean bills of health may be, and are frequently, obtained from infected ports. This is thought to be due to the fact of these bills of health being obtained from officers at the ports of departure who cannot, from the nature of their business and information upon subjects of health, be sufficiently familiar with questions relating to the public health to enable them to distinguish carefully between rumors of health and its actual condition; for at many of these ports there is no official report of health emanating from medical authorities.

Bills of health from French ports which I saw differ from all others in one particular. They have recorded an inspection of the sanitary condition of the vessel on the day of her departure, and also the health of her crew and passengers, and the health of the port from which she departed.

This concludes a brief account of my observations at these ports. Further and more extensive account will be given in my general report.

I am, very respectfully, your obedient servant,

E. M. WIGHT,
Inspector of Quarantine.

Dr. T. J. TURNER,
Secretary of National Board of Health, Washington, D. C.

SAVANNAH, GA., *July* 12, 1879.

SIR: I returned to this place yesterday, having effected important and effectual changes in the practice of quarantine at Brunswick and Darien, since my last communication to you; quarantine having been in both those places hitherto very inadequate. This report, however, please regard as preliminary only, as I have not yet received a promised communication from the owner of a portion of Jekyl Island selected as a boarding station for Brunswick, necessary to an estimate for that place, which needs assistance. Moreover, it is impracticable for me to make you a report as intelligible as I wish on either Brunswick or Darien, without the Coast Survey harbor charts, for which I have before made application, and which, from your communication of June 26, I expected to receive here on my return. If you will please refer to any chart of this coast, you will appreciate the importance of my request. I have been fortunate in borrowing such charts as have answered my purpose, but these I have to return. I have also just borrowed one for this place, before proceeding to inspection, by appointment, with the mayor and health officer on Tuesday. From what I have already seen of the system here, I have reason to think it is far from being efficient, and, taken in connection with the bad local conditions which obtain, there is abundant reason to fear the rise of an epidemic here at any time. "Rules and regulations," &c., approved by the President, and "circular to municipal authorities," &c., one copy of each, received. A dozen copies, at least, of each of these, and as many also of "schedule of questions," that I may have a copy to fill for each place within my district, would greatly facilitate my work. In addition to these and the charts really necessary to me, please also be kind enough to have forwarded to me, with as little delay as possible, check or draft for account rendered, necessary to cover my expenses.

Respectfully yours,

A. N. BELL, M. D.,
Quarantine Inspector.

Dr. THOS. J. TURNER,
Secretary National Board of Health, Washington, D. C.

SAVANNAH, GA., *July* 18, 1879.

SIR: Your communication of 15th instant, 12 copies of rules and regulations, and Forms No. 2, and two charts received yesterday. For my account, which you inform me has been transmitted, I have not yet received draft. I have to regret that the charts sent are on too small a scale to be of any practical utility. I therefore return them with a borrowed one, such as I require, illustrating my report on Brunswick and Darien, which I now proceed to make.

Your particular attention is invited to Coast Survey chart herewith, No. 157, designating the quarantine stations of Brunswick and Darien hitherto, the changes made under my advice, and the requirements of Brunswick. Beginning at this place, the difficulties of quarantine hereabouts are easily comprehended; hence the authorities felt constrained to protect themselves only, without attempting otherwise than by notice to pilots and through them to vessels in the harbor to protect other places, while leave-taking of passengers and sailors from vessels in the harbor before visitation of the health officer, or subsequently while in quarantine, was known to be common. The only visible evidence of quarantine at Brunswick consists in a rough wooden building on a mud flat designated as Brunswick Point or Brunswick River, and marked on chart X. In it six persons might be placed, but far from being either comfortable or safe—the flat being subject to oveflow by high tides. In this place I found a keeper with instructions to notify the health officer of all vessels requiring his services under quarantine instructions—his means of knowing being signals from

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HEALTH OFFICE, BRUNSWICK, GA.,
July 8, 1879.

DEAR DOCTOR: At a called meeting of the board of health of the city of Brunswick, July 7, 1879, attended by the mayor and other members of the city council, I placed before them for discussion your views in relation to our drinking water, privy system, location of cemetery, and quarantine. I am pleased to state that the board very readily adopted and fully approved the various suggestions and recommendations made by yourself, and that a committee was appointed, consisting of members of council and of the board of health, with instructions to take immediate action and report at the regular meeting, Thursday proximo, at 8 o'clock p. m.

I am instructed by authority of the board of health to lay before you for your approval, and through you to the National Board of Health, the necessity for the erection of a marine hospital, quarantine buildings, and the purchase of a steam launch or other boat, which would be suitable for use by the health officer for boarding vessels in Saint Simon's Sound, which boat could also be used by the customs officer when required.

We very respectfully submit a marine hospital is necessary in the interests of commerce and that this would be a central location for the ports of Doboy, Darien, Saint Simon's, Brunswick, Satilla, and Saint Mary's; that there is not a marine hospital nearer than Savannah, Ga., and that sick seamen have to be transported to Savannah from above-named ports at the risk of life to those sick, and, in case of contagious or infectious disease, at the risk of communicating the same to the interior.

With its present quarantine stations the city of Brunswick may be able in future to take care of itself, but, in view of the numerous avenues of escape into the interior beyond our quarantine station, contagious and infectious diseases may be conveyed to other points and become a source of danger to the whole country, and that, in order to prevent this, it will be necessary to establish a quarantine station at the mouth or entrance of the harbor.

We very respectfully represent: A quarantine station located on the north end of Jekyl Island at the entrance of the harbor, properly equipped and guarded, would be a safeguard to all such dangers; and that the same point would be a suitable place for a marine hospital.

In view of the financial inability of our city, it will be utterly impracticable for the board of health of the city of Brunswick to accomplish the above objects and indications. Whilst we may and will do all in our power, in accordance with the means at our command, it is probable that we might be unsuccessful in our efforts to guard other places.

We, therefore, earnestly and respectfully request you, in your official capacity, to bring this entire subject before the National Board of Health, and that you will use your influence and urge upon them, for the good of the whole country, the importance of the purchase of the north end of Jekyl Island, or a portion thereof, represented by a line drawn from a point just south of Clam Creek, and running east to low-water mark on the eastern side of the island; and that they will aid us in the accomplishment of the above specifications to the extent that may, in their superior judgment, be necessary.

I have not been able to procure an estimate of the cost of a tabby wall per square yard, as you requested, but will do so as soon as I can procure one from a competent person. I am satisfied, however, that this would be, by far, the cheapest durable structure that could be erected.

Very respectfully, your obedient servant,

JAMES S. BLAIN, M. D.,
Health Officer, C. B.

Dr. A. N. BELL,
Savannah, Ga.

Approved.

J. W. B. HABERSHAM, *Mayor.*

Attest:
JAMES HOUSTON,
Clerk of Council.

BRUNSWICK, *July* 11, 1879.

DEAR SIR: After consulting with friends, I have come to the conclusion that the erection of a marine hospital and quarantine station on north end of Jekyl will depreciate the value of the island, as a whole, fully to the amount of $10,000; and although I would prefer that nothing of the kind should be erected there, if it is found necessary I must name that amount as the price I place upon the land required.

Very respectfully, yours,

HENRY DU BIGNON.

Dr. A. N. BELL,
Savannah.

BRUNSWICK, GA., *July* 16, 1879.

At a meeting of the board of health of the city of Brunswick, Ga., held on this day the following resolution was unanimously adopted:

Resolved, That this board heartily approve and hereby adopt the rules and regulations recommended by the National Board of Health, and will endeavor to carry out the same promptly and effectively.

JAMES S. BLAIN,
Health Officer, C. B., Chairman Board of Health.

Attest:
JAMES HOUSTON,
Clerk of Council, Secretary of Board.

BRUNSWICK, GA., *July* 14, 1879.

DEAR SIR: In reply to communication of the 14th ultimo, please find copy of resolution passed by the board of health of the city of Brunswick.

I will attend to boarding of vessels according to your instructions, and will endeavor to prevent, so far as practicable with the means at my command, the introduction of disease at the port of Brunswick.

Please urge upon the National Board the importance of immediate action at this port.

Very respectfully, your obedient servant,

JAMES S. BLAIN, M. D.,
Health Officer, C. B.

DR. A. N. BELL,
Quarantine Inspector, National Board of Health.

BEAUFORT, S. C., *July* 24, 1879.

SIR: On the quarantine of Savannah, I respectfully report:

The authorities of the city government have recently established, on a shoal at the mouth of the harbor, a wooden structure on piles for a boarding station with resident accommodation for quarantine officer, and hospital provision for twelve beds. The place of location, I designate on Coast Survey chart 440 (which is sent herewith) marked with a cross, X, B, S, and H; anchorage for infected vessels, A, and for place of detention of well persons and cargoes, if necessary, D and C, on Turtle Island under tents and sheds, to be extemporized when necessary. The situations of these several departments are wisely chosen, and afford ample opportunity for the proper care and safety of the quarantined, as well as protection of the port from the seaward. In addition, the health officer of the city is expected to protect the public health from dangers incident to coasting vessels and steamboats through other channels. The commanders of these vessels have "instructions" to anchor their vessels mid-river and send for the health officer in case they have any disease on board; otherwise they are permitted to go to the wharves and send for the health officer; meanwhile (in both cases) to be careful to allow no one to go ashore or to communicate with the vessel until the health officer shall have made his visit. On my own observation, I am satisfied these instructions are not strictly observed. The steamboat on which I arrived from Darien proceeded, according to directions, to the wharf. The passengers were requested to remain on board, and did so; and hackmen and others were frequently ordered not to come on board—notwithstanding, some did—during the time of waiting for the health officer, who had been sent for by a messenger from the boat, and made his appearance in about an hour after the boat arrived; and, considering the distance of his residence from the landing, about as soon as practicable. And here it may be remarked the health officer is engaged in general practice, and, on information communicated to me by the captain of the boat, occasions are not unfrequent when (owing to the health officer's absence) he takes the responsibility of letting the passengers depart, risking and always getting the health officer's approval—the boarding fee being paid. This portion of the quarantine service, however (if it may be so called), is not without utility; its chief object is to secure cleanliness of the vessels and this I have taken much pains to emphasize. In the event of finding any quarantinable disease on board, or a vessel infected, persons and vessels so found would be sent to the quarantine station for treatment.

I inclose herewith copies of official regulations, schedule of charges, and promised action on the rules and regulations, marked 9, 10, 11, and will forward the action (as promised) as soon as received; I am now engaged in the inspection of Beaufort, Port

For every vessel over 750 tons and less than 1,000 tons, fumigating and disinfecting, each process 50
For every vessel over 1,000 tons and less than 1,250 tons, fumigating and disinfecting, each process 60
For every vessel over 1,250 tons, fumigating and disinfecting, each process, according to tonnage of vessel .... $70 to 10

Additional fees will be charged for medical attendance.

In all cases the quarantine officer will collect the charges made against ve before giving permission to proceed to the city, either by captain's draft on signees or in currency, as may be most convenient.

The quarantine officer shall report all vessels arriving at quarantine station as as possible after their arrival, their tonnage, condition, where from, number of da sea, and if any sickness or deaths during the voyage, and any or all other informa necessary to protect the public health. He shall also report as often as practic the condition of all vessels and crews during their detention at the quarantine sta and the number of times each vessel has been fumigated, and he shall give such o information as is necessary to enable the mayor or acting mayor and board of sani commissioners to give permission for vessels to be released from quarantine.

JOHN F. WHEATON,
Mayor, and Chairman Sanitary Commis

J. C. HABERSHAM, M. D.,
Health Officer.

11.

SAVANNAH, GA., *July* 22, 18

DEAR SIR: Your favor of the 20th instant reached me through the mail this m ing. No action has yet been taken in relation to the adoption of the National B of Health regulations by our board. The matter shall be placed before them at early day, and I have no doubt will be adopted.

I am very much obliged for your suggestions in relation to our sanitary condit Be assured that they shall not be neglected. I shall do all I can to preserve health. Where shall I address you in the future?

Very respectfully yours,

JOHN F. WHEATON,
Ma

Dr. A. N. BELL,
Sea Island Hotel, Beaufort, S. C.

P. S.—Will act on National Board of Health regulations to-morrow.

J. F. W.

SAVANNAH, GA., *July* 24, 187

DEAR SIR: The sanitary commission has adopted the following resolution, to w "*Resolved*, That from this date, in addition to the quarantine regulations now in for that sailing vessels from all ports be required to be inspected by the quarantine off before being permitted to proceed to the city. Notice of this order has been given the pilots. This will make it necessary for you to board and inspect every sailing v sel that arrives. The first object is to ascertain if there is any infectious or contag disease; then, if the vessel has been in infected ports during the past twelve mont and if there has been any sickness on board during that time; then the sanitary c dition and cleanliness of the vessel and crew; and, last, to enforce the condition t crews must sleep on shore while the vessel is at the city."

When all the conditions are favorable, that is, no sickness, and have not been infected ports during the past year, and the sanitary condition of vessel and crew go they will be permitted to proceed without detention. If sickness, or if vessel has b in infected ports during past year, or if in filthy condition, they must be detained a treated in all respects in the same manner as vessels are now treated from ports so of the latitude of Cape Hatteras. In all cases insist that crews sleep on shore wh vessel is at the city, and prohibit the removal of any bedding from vessels. It is v desirable to avoid unnecessary detention of vessels, and, if possible, to avoid the nec sity of their anchoring; with this view it will be well to be prepared to board all v sels, where practicable, below the quarantine station, in order that you may give proper directions, either to stop or to proceed, before the quarantine anchorage reached. You will charge a fee of $5 for every vessel boarded. This order does not any way change the orders previously enforced as to vessels from ports south of the atitude of Cape Hatteras; they will be treated in all respects as they have been in he past.

Very respectfully, yours,

JOHN F. WHEATON,
Mayor.

Dr. J. A. HUGER,
Quarantine Officer, Savannah River.

A true copy.
FRANK E. REBARER,
Clerk of Council.

SAVANNAH, *July* 31, 1879.

DEAR SIR: I am directed by his honor the mayor to forward for your information he inclosed copy of letter addressed to Dr. J. A. Huger, quarantine officer, in relation o quarantine matters connected with this port.

Very respectfully, yours,

FRANK E. REBARER,
Clerk of Council.

Dr. A. N. BELL,
Inspector of National Board of Health, Wilmington, N. C.

CHARLESTON, S. C., *August* 1, 1879.

SIR: Your communication of 30th ultimo, containing draft for $418.75, is received. I will endeavor to obtain receipts for the $18 disallowed from my return, but fear I shall not be able to do so, as I do not know the names of the boatmen. I picked them up at the wharves.

I inclose herewith schedules filled as far as practicable for Brunswick, Darien, Port Royal, and Beaufort with facts in regard to present condition of those places corresponding with my own observations. I also inclose report on Savannah. The quarantine of this city is for the most part well appointed, but I am not yet prepared to report it. In and about the city also there is much of interest to examine and report upon, which will yet give me several days' work.

Will you please send me the Bulletin—an extra copy, in addition to the one you send the Sanitarian? I have No. 1 only. Will have time to receive them here, and will report in due time my next place of address.

Very respectfully, yours,

A. N. BELL,
Quarantine Inspector.

Dr. T. J. TURNER,
Secretary of National Board of Health, Washington, D. C.

SANITARY INSPECTION OF SAVANNAH, GA.

CHARLESTON, *August* 1, 1879.

SIR: Inclosed herewith please find published reports and documents kindly furnished me by the mayor, Drs. Thomas, Habersham, Duncan, and Waring, giving the sanitary statistics and other important information of Savannah from 1804 to 1879. I also inclose a map of the city, for which I am under obligations to the city surveyor, Mr. ogg, showing the sewerage and drainage, the size of the sewers marked from 2½ to [illegible] feet in diameter, the course and place of emptying of the sewers; the Bilbo Canal, the marsh-water drains of Ogeechee Canal and Musgrove Creek; the principal wharves and railroad depots, cemeteries, offal depots, the water-works, &c., and the relations of these several works and places to the public health. The area of the city thus mapped out and built over is about two miles square, standing on an elevated plain or sandy plateau 50 feet above tide-water, fronting the Savannah River on the south, circumscribed on the northern, eastern, southeastern, and western borders with extensive low-lands from 1 to 3 feet below tide-water, most of which is now under wet rice-culture.

The yellow-fever epidemic of 1876 having been attributed by some persons in great part to the extensive wet culture in the vicinity of the city, an act was passed the following year "to provide for the drainage of Chatham County, so as to protect the

State from the epidemics of yellow fever and other diseases." Under this act
intelligent commission was appointed, which has done much excellent work, by dra
ing a large portion of the swampy region, marked in the map "Spinsfield plantatio
lying on the eastern flank of the city, comprehending several miles square, borderi
on the Ogeechee Canal, and extending to the river; and Teynac and Cuyler swam
on the southeastern border, converting the lands into dry culture, and lessening, it
said, the ratio of malarial diseases.

The general plan of the city of Savannah is too well known to require extend
description. Its broad streets and beautiful squares at every alternate crossing, shad
with magnificent trees, festooned with moss, have been so often described and pi
ured as to require mention only, because they seem to have monopolized and divert
attention from less attractive but much more important conditions in relation to pub
health. Between and intersecting these magnificent streets and squares and the re
of the houses which front upon them are an equal number at least of narrow la
many of them sunless by reason of the high walls which inclose the back yards whi
they bound. Into these narrow lanes open the stables, the back-yard drains, and t
kitchen gates, for the convenience of filth-throwing of every conceivable kind.

Of pavements there are none worthy of the name. A few only on the shippi
streets consist of broken stone to facilitate cartage, but none which will efficient
shed the surface water or prevent the absorption of filth. The sidewalks are but lit
better—badly laid out, of poor material. A porous sandy surface is the common rec
tacle for every species of filth. And in the midst, all over the city, at the most pro
nent crossings and corners of both streets and lanes, street pumps are conspicuous, I
of them, on the last report to the mayor, and these only 15 to 20 feet deep—just de
enough to catch and suck up the first subsoil drainage saturated with the filthy dra
age of the overloaded sand. Within the walled inclosures in the back yards there
more than as many more pumps, in still more dangerous proximity to the kitch
sink waters, and, on an average, of about 25 feet distance from the privy vaults.
these vaults there are at present estimated to be no less than 4,000 throughout the ci
laid in brick without cement, leeching their liquid contents into the soil and drinki
water and filling the air with foul emanations. And thus it has been with hundr
for a century. As an example of the relations of a pump to a deadly neighb
hood—while making this inspection, accompanied by one of Savannah's ablest me
cal practitioners, and over one of the most fashionable drives, as we were pa
ing through the toll-gate on Thunderbolt road—my companion pointed out a
field now under dry culture a quarter of a mile off, and observed that when the
demic of 1876 fell upon the city that field was under wet culture and at the ti
under water; "and here," said he, "within 200 yards of this gate, seventeen pers
died of yellow fever." Running my eye over the number of houses in view, I repli
"Doctor, that means not less than seventy cases; all the people about here must h
had it, and there must have been some other cause besides that wet culture: that al
would not give yellow fever." My companion had been a member of the city co
cil, and had been active in the promotion of drainage—so active in it that he seems
have given but little consideration to any other cause of unhealthfulness. I cut sh
his effort to convince me of the sufficiency of wet culture by suggesting that the ca
of the terrible fatality in that particular neighborhood was probably still in existen
and volunteered to search for it; and, with that object in view, insisted on the effo
The toll-gate is under an arch—on one side the office and on the other a store
dwelling, these last bounding two sides, at right angles, of a yard about 25 feet squa
On entering from the road-side the conditions were at once apparent: at the cente
one side of the yard, separated by a picket fence from the barn-yard and poultry-y
(which were also separated from each other by a picket fence), was the pump, ab
15 feet, respectively, from the house on one side and the privy on the other, and div
ing the line between the barn and poultry yards and the house-yard. The yard
strewn with surface filth, was moist with kitchen slop-waters, and had evidently ne
been cleansed. Besides the seventeen deaths from yellow fever around this pump,
companion and the gate-keeper counted up among the families of previous gate-ke
ers three, and their wives and two children, since 1871. The water-works, which h
been in use about a dozen years, are situated near the river (see map), and take t
supply just at the outlet of the Musgrove Creek and Ogeechee Canal Swamps,
large sewers about 100 feet off (below) on one side, and the Central Railroad Wh
at which the New York steamships discharge cargoes, cleanse and load. Besides t
sewers and drains, which empty right at the place of the water-works inlet from
river, all the other sewers and drains of the city empty into the Bilbo Canal.
outlet of the famous open sewer is into the river about a mile and a quarter be
those above described. The rise of the tide in the river at the water-works is f
5 to 6 feet. During some period of every flood tide, therefore, the contents of
Bilbo Canal are met at the mouth and flooded up to the place of inlet of the w
basins, adding to the mass of impurities of the sewers and drains constantly in se
at that particular point.

The number of people in the city who use the reservoir water and those who use pump water are supposed to be about equally divided; there were no statistics on the subject. No one that I conversed with on the subject seemed to be quite satisfied with the water supply; thought it might be better, but did not think it really bad, only a little brackish. No analysis of it seems to have been made since its introduction. But without this there is now an enabling bill before the legislature for obtaining water a mile and a half farther up the river, where there is still a rise of tide 4 or 5 feet, certainly carrying up the sewage in dangerous amount even beyond that distance. I suggested to the mayor and others of the health department the propriety of seeking water from deep water-bearing strata below the river bed (at a point marked W on the map), two or three hundred yards west of the present works, which could be utilized in such a source of supply, and probably of very superior quality to any which can be obtained from the river, considering that, in addition to the risks of the sewage set back by the flood-tide from Savannah, there is also constantly coming down-stream the sewage of Agusta.

A pure water supply is Savannah's first and greatest necessity. Until it is obtained there appears to be no practical way of getting rid of the privy vaults, foul soil, and foul atmosphere, which, with impure water, constitute a source of danger to her people of enormous magnitude.

A. N. BELL,
Sanitary Inspector, National Board of Health.

Dr. T. J. TURNER,
Secretary of National Board of Health, Washington, D. C.

CHARLESTON, S. C., *August* 8, 1879.

SIR: I respectfully report on the quarantines of the Beaufort district (Port Royal and Beaufort and Coosaw) as follows, and for a clearer understanding of the relations of these quarantines to the dangers of yellow fever through them to Savannah and Charleston your attention is invited to the marked charts herewith:

1. Port Royal and Beaufort, Coast Survey Chart No. 438: Present residence of the health officer on Ladies' Island, R.; boarding station and anchorage ground for infected vessels, Beaufort River, B. A.; stations which admit of easy escape from vessels anticipating quarantine to common steamboat landings on inside passages and difficult of efficient policing.

I recommend change of health officer's residence to place marked H. O. R., on Station Creek, Phillips Island, on land believed to belong to the United States, and where now exist the remains of a government dock; for boarding station, the mouth of Beaufort River, opposite place chosen for health officer's residence; and anchorage ground for infected vessels, between the mid-river shoal and Paris Island, marked I. V. On either side of Station Creek, accessible and yet sufficiently distant from health officer's residence, tents and sheds, or more permanent structures if deemed necessary, may be erected at a safe distance from one another for the care of the sick, the well, and merchandise; and all without encroachment upon or in danger of any population. In the selection of these stations I was accompanied and aided by the health officer, Dr. Johnson, Dr. Stuart, president of board of health of Beaufort, and Dr. Kidder, U. S. N., of U. S. R. S. New Hampshire.

2. Coosaw, Coast Survey Chart No. 435: The importance of this place is due to the number of men employed here and hereabouts in the phosphate works. In the one establishment and factories at Coosaw, at the time of my visit, there were about 600, nearly all negroes, besides several smaller gangs on and in the river within a few miles. It is a place of considerable and increasing commerce. On examination of the collector's record at Beauford, of 49 vessels which arrived at Coosaw during the months of July, August, and September, 1878, twenty-five of them were from ports in South America, West Indies, Africa, and Cape de Verde Islands, where yellow fever frequently prevails. The dumping place for ballast is about half a mile above the chief factories, and the stevedores engaged in it in constant communication with the establishment. The residence of the health officer, Dr. Sams, is at present, Buzzard Island, on Bull River, marked on the chart R.; boarding station, ar the mouth of Bull River, marked B.; the portion of the river between this station and the Combahee River is common dredging ground for phosphates, where vessels frequently anchor, and where many flats are employed, with large gangs of men. There were two ships and five flats in this reach at the time of inspection.

Coosaw has escaped yellow fever thus far, but under the conditions which at present obtain it is in considerable danger. This opinion is shared by the superintendent of boarding station in passing and repassing—if a ship should be infected and sent back the chief works, Mr. Lopez, who especially complains of the dangers incident to the to the anchorage—near other vessels and flats with large gangs of men.

I recommend a change of the health officer's residence to Hutchinson's Islands, place marked H. O. R. The space between the two creeks which bound this place north and south is ample, and suitable for the erection of tents and sheds or more permanent structures, whenever deemed necessary, without danger from too close proximity to one another or any populaton.

The health officers' residences of both these quarantines are fixed by law: for Port Royal, on Paris Island, and Coosaw, on Morgan's Island, but the officers have been permitted to change on their own account. While the places designated by law are less objectionable than those now in use, they are, for evident reasons, inferior to those herein advised and approved of by Dr. R. Lebby, the supervising health officer of the State, who promises his influence for effecting the changes recommended.

Being not yet prepared to report in full on the quarantine at Charleston, I only have to say at present it is well situated and vigilantly administered. I purpose proceeding from this place to Georgetown on Tuesday next, and thence, after a few days, to Wilmington, N. C., at which place please make my next post-office address. New schedules received.

I have the honor to be, respectfully, yours,

A. N. BELL,
Quarantine Inspector.

Dr. T. J. TURNER,
Secretary of National Board of Health, Washington D. C.

WILMINGTON, N. C., *August* 23, 1879.

SIR: The quarantine establishment of this port consists of an excellent hospital building, equal to twenty beds, well situated in an isolated place about 2½ miles from Smithville, 31 miles from Wilmington, on the east bank of Cape Fear River. The quarantine physician resides and does his boarding from Smithville, at a place in the river a little less than half the distance from his residence to the hospital, at a safe distance from the shore, where vessels subject to his visits are required to come to anchor. The anchorage ground for infected vessels is on the west side of the main channel, opposite the hospital, and need not be approached by passing vessels nearer than three-quarters of a mile. As a place of detention of well persons in case of necessity available space exists in abundance for the erection of tents on the bank of the river between the hospital and Smithville, and sufficiently distant from both as well as from any other population. For a quarantine warehouse or shed there is no convenient place except at large expense for the construction of a wharf, by reason of the width of the shoal-water from any ground high enough to the channel. The necessity of discharging cargo in quarantine at this port, therefore, would require the use of lighters or flats, which are sufficiently abundant to be economical. Smithville, the place of residence of the quarantine physician, is a town of nearly a thousand inhabitants, and a place of resort from Wilmington during the quarantine season. Local conditions exist at this place of such a character as to render it very liable to infection if in communication with infected vessels, involving great care on the part of the quarantine physician in regard to his boatmen. This care, he assures me, is habitual.

The prohibiting regulation enacted by the city council, signed by the superintendent of health, appended to the quarantine regulations of the quarantin ephysician and consulting physicians, has given rise to just cause of complaint by the merchants; but I am assured, after conference with some of the authorities, this unnecessarily severe restriction will probably be abrogated at an early meeting of the council; that the rules and regulations recommended by the National Board of Health will be adopted, and their spirit, in the future, acted upon. I have been very heartily welcomed here by both the public authorities and citizens, just at the beginning of sanitary administration under the "New Hanover County board of health," which is barely a month old, and my visit promises to be a fruitful one. It has rained daily, however, since my arrival, embarrassing my work somewhat, but improving my opportunity for examining ponds and water-sheds, which will enter into a special report on the condition of the city and surroundings after I shall have completed my inspection.

Very respectfully, your obedient servant,

A. N. BELL,
Quarantine and Sanitary Inspector, National Board of Health.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

QUARANTINE REGULATIONS, PORT OF WILMINGTON, N. C.

OFFICE OF THE QUARANTINE PHYSICIAN,
Smithville, N. C., April 1, 1879.

The following quarantine regulations will be enforced for the port of Wilmington from this date, and the penalties, of $200 for every violation thereof, stictly enforced. Pilots violating the same are liable to the loss of their branch:

1st. Pilots will be notified from time to time of the ports from which vessels are subject to quarantine, and all vessels from such ports must come to anchor at the quarantine station, and not depart thence without written permission from the quarantine physician. Pilots may obtain full particulars as to their duty with reference to vessels subject to quarantine by inquiring at the office of the quarantine physician.

2d. Universal cleanliness must be preserved on board all vessels detained in quarantine: the forecastle, steerage, and cabin must be scrubbed, all foul wearing apparel and bed-clothing of officers, passengers, and seamen must be washed and aired, and all infected articles destroyed, and disinfection practiced as directed by the quarantine physician.

3d. The bilge-water must be pumped out twice a day, and water from alongside put in until the water pumped out shall be clear and free from any offensive smell; and wind-sails must be kept up in each hatchway, and trimmed to the wind whenever weather permits.

4th. Commanders of vessels are accountable for all irregularities committed on board their respective vessels and for the conduct of such of their people as they may send on shore by permission of the quarantine officer, and if any person shall leave a vessel in quarantine, or go on board of such vessel without the written permission of the quarantine officer, he shall, on conviction, suffer punishment as by law provided; and all persons belonging to a vessel in quarantine are strictly forbidden to take on board any person who did not arrive in such vessel without a regular permit from the quarantine officer.

5th. All communication between vessels in quarantine is expressly prohibited, and no boat or craft is permitted to go alongside a vessel in quarantine except the master thereof have a written permission from the quarantine officer.

6th. Provisions and other necessaries intended to be sent on board vessels at quarantine must follow the same rules and regulations which apply to other communications with the vessels, and all arrangements for discharging and taking in cargo must be made with the sanction of the quarantine officer.

7th. Colors must be worn and a light must be hoisted at night so long as the vessel is detained in quarantine.

8th. All vessels upon which any case of infectious disease has occurred during their passage, or upon which any person has died; all vessels from ports known to be infected with small-pox, yellow fever, cholera, or plague, shall not be permitted to approach Wilmington nearer than the quarantine station.

W. G. CURTIS, M. D.,
Quarantine Physician, Port of Wilmington.

J. C. WALKER, M. D.,
THOS. F. WOOD, M. D.,
Consulting Physicians.

OFFICE OF SUPERINTENDENT OF HEALTH,
City of Wilmington, N. C., April 1, 1879.

Any and all vessels arriving in the Cape Fear River from the West Indies, South America, or any infected ports, whether they have had sickness on board or not, will not be allowed to approach any nearer this city than the quarantine station; nor will they be allowed to discharge or take cargoes, or have any communication with the city whatever, until after the 1st of November.

J. C. WALKER, M. D.,
Superintendent Health, City of Wilmington, N. C.

To the Cape Fear pilots:

Pilots are notified from and after 1st day of May, 1879, and until further notice, to bring all vessels from ports south of Cape Fear, also all vessels with any kind of sickness on board on arrival, or that have had any kind of sickness during their voyage, to the quarantine anchorage for inspection.

W. G. CURTIS,
Quarantine Physician, Port of Wilmington.

QUARANTINE ACT FOR PORT OF WILMINGTON, N. C.

[Battle's Revisal, chap. 98.]

SEC. 20. For the preservation of the public health, there shall be established, opposite Deep Water Point, near the mouth of the Cape Fear River, a quarantine station where all vessels subject to quarantine shall be brought to anchor and await the inspection of the medical officer, and be subject to such rules and regulations as he may prescribe; and the rules and regulations so prescribed shall be made from time to time, as circumstances may require, by the quarantine medical officer and two physicians of skill and experience residing in the city of Wilmington, who shall be designated by the president of the State board of health, and they shall meet annually on the first Monday in May, or as soon thereafter as practicable, and organize for the purpose before mentioned by the election of a president and secretary; and it shall be the duty of the president to call meetings whenever any special emergency shall arise requiring new quarantine rules and regulations, and of the secretary to keep a record of all such proceedings. And they shall be entitled to compensation for their services at the rate of five dollars per day and their actual traveling expenses to and from said meetings: *Provided*, Said physicians shall not receive per diem for more than six days in the year, unless in case of prevailing epidemics.

SEC. 21. It shall be the duty of the governor to designate some physician of experience, who shall act as medical quarantine officer for the above station, and who shall prescribe such regulations as may be necessary for the protection of the inhabitants from infectious diseases; and all persons shall be bound by such regulations under penalties to be hereafter designated. The quarantine officer shall duly advertise all quarantine regulations and cause the pilots to be especially notified of them. He shall make a monthly report of all receipts and disbursements, and shall pay over all moneys to the treasurer of the State, and shall be removable at the pleasure of the governor.

SEC. 22. There shall be provided for the use of the quarantine officer a suitable boat furnished with all necessary materials, and he shall employ a crew of four men at such seasons as quarantine regulations are in force or when the public health may require it. He shall cause the boat to be kept in repair and always ready for service, and may employ some competent person for this service, which shall be paid for out of the public treasury on the certificate of the medical officer that the services were necessary and the charges just and reasonable.

SEC. 23. There shall be established, at the nearest convenient station upon the shore, a hospital sufficient for the accommodation of such sick persons as the quarantine medical officer may direct to be removed from vessels for better nursing and attendance, and the medical officer shall employ such attendance as may be necessary to take care of the sick, and may purchase such articles of food as they may require.

SEC. 24. Every vessel subject to visit and inspection shall pay a fee of five dollars, which shall be collected and accounted for by the medical officer, and every sick person taken to the hospital shall pay a fee, not exceeding three dollars per day until discharged by the medical officer, for the payment of which the vessel shall be responsible; and only such vessels shall be subject to visit and inspection as may be from ports designated from time to time by the medical officer, except that all vessels having sickness on board shall be brought to the visiting station for examination.

SEC. 25. It shall be the duty of all pilots to bring vessels to the visiting station as they may be required from time to time by the quarantine officer, and they shall not take any vessel subject to quarantine or visitation past the station until released by the quarantine officer; and any pilot who shall willfully violate any quarantine regulation shall forfeit his branch or commission, and from thence be deemed incapable to act as a pilot in any port in the State.

SEC. 26. Any master of a vessel who shall refuse to obey the quarantine regulations shall forfeit and pay a fine of two hundred dollars for each day he shall refuse to obey the same, for which forfeiture the property of the captain, together with the vessel and cargo, shall be held responsible.

SEC. 27. Any person who shall violate the quarantine regulations, as prescribed from time to time by the medical officer, shall forfeit and pay the sum of two hundred dollars for each and every offense; and all penalties and forfeitures imposed by any of the provisions of this chapter may be recovered before any jurisdiction having cognizance of the sum due, and applied, one-half to the informer, the other half to the payment of the expenses of the quarantine establishment.

SEC. 28. The quarantine medical officer may issue a warrant to any sheriff or other officer, commanding him to arrest the body of any person violating the quarantine, and have him without delay before some competent jurisdiction for trial.

SEC. 29. The compensation of the quarantine medical officer shall be six hundred dollars per year, and the compensation of the boat's crew shall be twenty dollars per month each while regularly employed, provided one of the crew may be designated by

29

tine officer to take care of the buildings, boats, and materials at an extra
on of ten dollars per month while so employed.
For the purchase of a site and for the erection of suitable hospital buildings,
oat and necessary materials and expenses for quarantine service, the sum
usand dollars is, and the same is hereby, appropriated from any moneys in
treasury not otherwise appropriated, to be expended under the direction of
tine officer and a commissioner to be appointed by the governor: *Provided*,
aid commissioner shall receive no compensation for his services.

KINGSTREE, S. C., *August* 15, 1879.

espectfully report the quarantines of Charleston and Georgetown as follows:
Charleston. The establishment consists of health officer's residence on James
ar Fort Johnson, in good condition and well situated; hospital buildings
ings Point, Morris Island; two structures, one for yellow fever, equal to
ls, and one for small-pox, half as large, both in good condition and well
nd in case of necessity accommodation could be enlarged by awnings from
ures or by tents. The landing or wharf at Fort Johnson, leading to the
er's residence, is exceedingly dilapidated, past repairs and, indeed, of rebuild-
ort distance from this wharf is an old wooden building which might be
small expense for a warehouse. It is large enough for an ordinary cargo,
se that it be appropriated and adapted to the purpose. This property, Fort
old wharf, building, &c., I am informed, belongs to the United States, was
since the war occupied by the Light-House Board, but it has recently been
l by that department, and so reported to the honorable Secretary of the
I recommend it to be appropriated to quarantine purposes, for which it is
situated, and put in condition. Anchorage for infected vessels, off Fort
ufficiently distant from both main channel and shore to admit of safety and
he establishment is well conducted, and with the addition and repairs of
and wharf, as above recommended, would be complete.
ider special obligations to the health officer, Dr. Robert Lebby, and his
d oarding officer, Dr. Lebby, jr., for affording me the fullest facilities for
, and for the full statistical information and official reports herewith in-

of Georgetown. This is a place of very considerable commerce, having had,
months of July, August, September, and October last year, no less than 44
vessels of all classes, besides steamboats at least twice a week from Charles-
re was but one vessel only during the season from an unhealthy West Indian
for a short time detained. Notwithstanding the surroundings and commerce
ce are abundantly suggestive of the necessity of quarantine, which at present
a health officer only, who is required, on a salary of $400 and $100 allowances,
whatever may be necessary for the exercise of his functions. Your atten-
ited to Coast Survey Chart, No. 428; health officer's residence and boat land-
esent at a little village of eight or ten families, on South Island. Being a
r, and having had no occasion since his appointment, this year, to detain any
was uncertain as to a proper place of anchorage; thought he would send any
el to Mud Bay, but he had evidently not made himself familiar with the
ngs. I advised, in the event of his having an infected vessel to deal with,
have her anchored near place marked on chart herewith, 15 feet depth near
rn margin of Mud Bay Shoals, and that he should at once change his resi-
n the inhabited South Island to the equally convenient and *uninhabited* North
e opposite shore; and moreover, that he should there select appropriate
the erection of tents for both the sick and the well, and a good landing place
for a shed, in the event of an infected cargo, to which he readily acceded.
tly, on interview with the intendent (president of the city council), I secured
se of a quarantine buoy, without delay, at the place designated for anchor-
ore vulnerable place than Georgetown, if it should happen that an infected
uld be permitted to go to the wharves, would be hard to find. A nominal
ealth has been recently created there, but the only information I could ob-
gard to vital statistics was from a clergyman's burial records, which gives
an 35 deaths per 1,000 of the population, among the most intelligent and
for people. I think I have excited some interest in the subject, and I have
se of some researches which may possibly be of sufficient importance for a
tal report.
leston and its surroundings I have already gathered much useful informa-
have more to come, which it is my purpose to embody in a special report.
I also inclose an additional document on the quarantine regulations of
, sent to me a few days ago.

This old fashioned town of King's Tree, at the end of the stage road, 44 miles f Georgetown to Wilmington, has a sanitary outlook of some interest, which, if the pouring rain holds up before railroad time to-morrow, I purpose to examine, and i any importance to report.

Very respectfully, your obedient servant,

A. N. BELL,
Quarantine Inspector, National Board of Healt

Dr. T. J. TURNER,
Secretary of the National Board of Health, Washington, D. C.

SANITARY INSPECTION OF CHARLESTON, S. C.

GARDEN CITY, L. I., *December* 2, 187

SIR: Of my inspection of Charleston during the first two weeks in August l respectfully report, and herewith inclose marked map of the city, communicat and diagrams on the construction of the tidal drains, streets, &c., from Mr. L. J. bot, city engineer, to whom I am under obligations for assistance, and copy of rev ordinances of health department from Dr. Pelzer, registrar. I am also under obl tions to Captain Post, United States revenue service, for valuable assistance in tak me round the water front of the city; to Dr. Wm. T. Wragg, for valuable infor tion in regard to the tidal drains; also to him and to Drs. Lebby, Kirsloch, and D son for information on the relations of certain local conditions to yellow fever Charleston and vicinity.

The almost tide-water level of Charleston seems to have engaged the attention the inhabitants from an early period, but how early cannot now be ascertained, reason of the destruction of records during the war. From the information furni by Mr. Barbot, the oldest record extant shows that many covered street drains w constructed during the period 1806 to 1818, and subsequently, as late as 1856, at wh time the old drains were for the most part destroyed and substituted by the "ti drains" which are now and have been ever since the only reliance. The old dr are represented as having been constructed without any specific plan, without g ing, and, in short, as being little more than mere elongated subterranean cess-p Of the tidal drains, Dr. Wm. T. Wragg, who was the pioneer of the work, has kin furnished me the following account:

* * * "The topography of Charleston is so flat that in any system of drain all idea of constructing sewers on declivity was out of the question. To obtain a f competent for moving water in them, therefore, it was necessary to use the water it for that purpose. Fortunately we had for this end the rise and fall of the tides. T tides would enable us, with properly constructed sewers, to give the water suffici movement for the washing out of solid sewage matter if scientifically managed. will not be possible to go over in detail the history of the work; I can only give results.

"The bottoms of the drains were built on a dead level. The level was 30 (or inches above mean low water. The top of the arch a foot above ordinary high wa but just about the level of spring tide, so that at each recurrence of spring tide, entire capacity of the sewer being occupied by pure sea-water, all gases would thoroughly expelled. The drains were furnished with water-tight doors at each So far in our plan we had the means of carrying out our views, but in the constr tion of the work we were compelled, for want of funds, to do what we would willi have avoided, viz, use wooden instead of brick bottoms, and to give them a instead of an egg shape. The soil of Charleston is such that at the depth of drains bottoms, there is a stratum of quick-sand. This, while it would have mad difficult and expensive to lay down brick, was an advantage for the wood, since material, so long as it is submerged, does not decay. Hence, we had no fears of work being jeopardized in the future by that cause. And here let me say that I h no faith in the reports of the city officials, who are covering up the neglects of sewers by attempting to screen themselves behind the charge that they are fal into decay. The sewers, constructed as above detailed, had their openings or mo at two very distant points. One set of mouths was at the upper suburbs, the other the extreme lowest end of the city. At both ends they opened into the rivers that around Charleston on three sides.

"And now as to the manner of managing these drains so as to secure the re promised for them. This was provided for in an ordinance framed by the commi who had conducted the work. A drain-keeper had been selected, and his instruct were to this effect, viz: Taking up the description at the point at which the ti low and the drains empty, the gates should all be closed and kept so till the next tide. At the moment of the highest tide the gates at the upper end of the d

would be lifted and the outer water allowed to rush in till they were filled, which could be accomplished in about two or two and a half hours. At this time the upper gates were to be again closed and the water kept in until the next low tide. Now, the lower gates should be raised and the rush allowed to go on until the drains were empty. By this process it will be seen that the wash would be always going on in one direction, so that all solid matter would move in the same way and tend to pass out to the lower mouths.

"It was not contemplated to depend alone on the flushing for clearing out the solid matter, for, seeing the great length of the longitudinal drains, this process would require too much time; so it was made the duty of the keeper to traverse the entire length of the drains once in every twenty-four hours, and removing the covers from the manholes (an arrangement in the constructions * * *) to sound them carefully, and if any mud or other matter should be found there to remove it at once. It was also his duty, if heavy rain should come on while the drains were full of water, to open the lower gates so as to ease off the pressure that would arise from too great an inflow. He was also instructed to retain the night tide in the drains for the use of the engines in case of fire.

"The old drains of the city had been constructed entirely without any plan. They were on different levels, and many of them were culdesacs, having no outlets. It was contemplated, from time to time, to bring these into harmony with the tidal drains. But with the change of administration of the city officers the new broom made a clean sweep. The first thing the new mayor did was to dismiss the drain-keeper, and put the care of the drains in the hands of the police, who knew nothing and cared less about the new duty. In the course of a few years mud and sand had been allowed to accumulate to such an extent that the drains were full, in some places up to the crown of the arch, necessitating a heavy outlay to remove it. The clearing out by this process (sending men down and drawing up the mud through the manholes) has never been properly done; the accumulation has never been properly removed. Masses have been left in parts of the drains not easily reached, and hence the charge made by the city engineer, viz, that the bottom levels have been destroyed by the decaying of the floor and the consequent crumbling of the cheekwalls and the arches. The flow of water being impeded by local accumulations of solid matter at intervals along the floor, he accounts for by alleging that the work was decayed.

"I mentioned above that the site of Charleston is underlayed by quicksand. This stratum supplies an inexhaustible supply of water. It is well known that wood will not decay in water, hence the allegation that the plank bottoms have rotted is evidently inaccurate. The fault is in the management, and while I freely admit that the drains are not doing what it was claimed for them that they would do, I as fully claim that the failure is not in the plan or workmanship, but in the management.

"Much discussion went on while the work was in progress, and men of high pretensions to scientific attainment denied that any current would flow from the mouths when the gates were opened. To convince them, an exhibition was given to which all doubters were invited, and to their utter amazement, when the gate was opened, they saw half bricks and paving stones roll out before the impetuous torrent.

"There is one more point to which I wish to allude before concluding. I mentioned above that want of funds had forced us to modify our plan in order to bring it within the means at our disposal. One of these modifications was this: In order to have always at disposal an abundant head of water, it was recommended to form a large reservoir in the marsh above the city, and connect it with the system of drains, so that it might effect the flushing more perfectly than could be done by the water alone contained in the drains. The marsh at Creighton's bridge, up Meeting street, was selected for the purpose.

"This sketch, hastily written, and altogether from memory, is quite inadequate to give an idea of the intention and execution of our work. But such as it is, it is much more than I ever expected to make * * * .

"WM. T. WRAGG.

CHARLESTON, *August* 23, 1879."

It is evident from the foregoing, as well as by limitation of ordinance, that the tidal-drains were solely adapted to surface and soil water, whatever may have been the original intent, and so laid as to admit of percolation. The connection of any house or other drain with them was expressly forbidden "except by special permission of the mayor." More than twenty years' maintenance of this "special permission" has evidently had the effect of establishing many connections both of private dwellings and public institutions. Among the latter may be named hospital drainings; this, however, on the constantly increasing foulness of the drains has recently been cut off. Moreover, street culverts seem to have come in under the same condition, for they do not appear to have been provided for in the construction. These, throughout the city, bear evidence of pervading foulness—escape-holes for putrid emanations from an enormous mass of filth to which they have contributed. Whatever may be the

On the letting in of the tide now at high water, and opening the gates a
it flushes nothing; it merely saturates the contained mass, trickles ou
both ends, and saturates the contiguous soil by leakage.

The accumulations of filth at the outlets of the drains in the slips and
front is exceedingly offensive, and an unquestionable source of danger to t
The worst of these accumulations are at the foot of Calhoun street, M
Queen street, Custom-house wharf, and Meeting street. These places ar
on the map herewith. The shoals of filthy mud at low water off these slips
bank up the trickling filth and render the whole neighborhood noiso
from present appearances these, accumulations have been going on for se
and it was hereabouts, according to the official report of Dr. Robert Le
that in that year "the first case of fever which approximated to yellow fe
on board a schooner laden with coal from Philadelphia at Johnson's wh
Hamlin's and Marshall's wharves, on Cooper River, northeastern section of t
schooner had been at this wharf for several days, and the mate * * * sick
30 and died September 3. A second case of mild type was a clerk of the W
Brown's wharf. Again, on board the bark Sylph; which discharged he
rock and sand and loaded with naval stores, hauled out in the stream off E
the first mate sickened that night, then the second mate, and afterward
The two mates died and the boys recovered. * * * Several vessels a
wharf, and other wharves near the outlets of large drains, had their cre
with this fever. From all the information I have been able to collect I a
that the fever was of local origin."

In one of these slips, and on one of the hottest days of my inspection,
I observed dredging going on at low-water, with the view of getting rid
filth dammed up by the solid deposit at the outer margin. The loaded fla
off to the edge of the channel only, and the load there dumped in po
swept back by the tide to the place from which it was taken, or into neigh

The drain at the foot of Meeting street, on the Battery, discharges wi
dred feet of the bath-house, which is consequently rendered dangerous to
it. A fatal case of diphtheria, recently, in a person who was in the ha
the bath, justly led to the suspicion by the physician, my informant, tha
was caused by this drain, and other cases are attributed to the same caus

Other bad conditions due to defective drainage of another kind are also
by shadings on the map: some eight blocks of dilapidated buildings occu
people, bounded by Calhoun, Cannon, Rutledge, and Corning streets;
Trumbo, Trapman, and Franklin streets; Judith, Reid, and South stre
first and largest of these regions, in particular, surface filth abounds. In t
privies are surface deposit, and the prevailing odors are the same as those
from the street culverts, modified by the sprinkling of a mixture contain

31

IN

bottom and walls.
Section showing im-
ection for bottom.
inlets of yard
and Street

ole and Sand
udinal Section.
work, rack
movement of the
effluent gates
flushing.
reet level.
marble posts with
ich gates move.

r

out into the bay. According to high medical authority here, the exemption
ton from any epidemic of yellow fever from 1858 to 1871 is due to the sanit
of these tidal drains; and the recurrence of the epidemic since may be att
the fact that from some cause these drains were choked up and were nc
effective as originally.

In order to ascertain the cause, I directed the tidal drain-keeper, when
were emptied, to try the level of the bottom. He was provided with a 2-fo
tape line, and took the depths from surface of water which remained in th
the bottom of the drains. The profile, which was made from the notes taken
showed that in very many places the drain bottom only had settled conside
the quicksand, in many places from 6 to 30 inches.

To every one familiar with the subject of hydronamics, it will readily a
its former effectiveness is affected from this cause alone. This grave obj
brought to the attention of council at the time, and the remedy suggeste
reform and reconstruct the bottom agreeably to diagram which I send yo
addition to this, to build the reserve as originally intended and recommen
Wm. T. Wragg in his report on the tidal system of sewerage, which w
secured a constant supply for scouring, &c.; but for reasons which I cannot
to explain, these suggestions were not carried out. Hydraulics and sanitar
ing must and shall one day triumph, for you know it really means “
wealth.” As by ordinance it is very unwisely provided that these drains
source of water supply in case of fires (just think of it, and that, too, witho
voir, and drains built of dry masonry on a quicksand formation), it will be
on examination of the table, that from nine to ten days during the month
are not flushed, and that gates Nos. 1 and 6 are only opened to repleni
through the dry masonry and the sand bottom on which the flooring rests
every tide used for the purpose of replenishing brings with it a large amou
ter. The mud and sand so brought in sets very firmly, and is with grea
moved by the tidal current when the flushing and scouring is again resorte
quently the pick and shovel has to be used in the Corning street sewer to
sage to the water. These drains should be prepared so as to be used alt
the means of sewerage for which they were originally designed.

How strange it seems that any one should have thought of making a
provides that such filthy water as they contain, impregnated with the wo
impurities from the drainage of streets and yard surfaces, cesspool evacua
should be again thrown upon the streets and yards, and even into private
and on roofs of houses in case of fires, to undergo another evaporation and
sition of the organic matter therein contained, filling the atmosphere with
ous gases, though fanned by the sweet and summer breezes of the Ashley a
Rivers!

rs for opening and closing tidal drain-gates, for July. 1878—Continued.

m., open IV
m., close IV
m., open ....I and VI
m., close ....I and VI
m., open V
m., close V
m., open ....I and VI
m., close ....I and VI
m., open III
m., close III
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open IV
m., close IV
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open V
m., close V
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open III
m., close III
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open IV
m., close IV
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open V
m., close V
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open ....I and VI
m., close ....I and VI
m., open III
m., close III
m., open ....I and VI
m., close ....I and VI
m., open IV
m., close IV
m., open ....I and VI
m., close ....I and VI
m., open IV
m., close IV
m., open ....I and VI

2.45 p. m., close ....I and VI
24. 7.30 a. m., open III
9.30 a. m., close III
1.45 p. m., open ....I and VI
3.45 p. m., close ....I and VI
25. 8.30 a. m., open IV
10.30 a. m., close IV
2.45 p. m., open ....I and VI
4.45 p. m., close ....I and VI
26. 9.30 a. m., open V
11.30 a. m., close V
3.45 p. m., open ....I and VI
5.45 p. m., close ....I and VI
27. 10.45 a. m., open III
12.45 p. m., close III
4.45 p. m., open ....I and VI
6.45 p. m., close ....I and VI
28. 5.15 a. m., open ....I and VI
7.15 a. m., close ....I and VI
11.30 a. m., open IV
1.30 p. m., close IV
5.45 p. m., open ....I and VI
7.45 p. m., close ....I and VI
29. 6.00 a. m., open ....I and VI
8.00 a. m., close ....I and VI
12.30 p. m., open V
2.30 p. m., close V
6.30 p. m., open ....I and VI
8.30 p. m., close ....I and VI
30. 7.00 a. m., open ....I and VI
9.00 a. m., close ....I and VI
1.15 p. m., open III
3.15 p. m., close III
7.15 p. m., open ....I and VI
9.15 p. m., close ....I and VI
31. 7.45 a. m., open ....I and VI
9.45 a. m., close ....I and VI
2.00 p. m., open IV
4.00 p. m., close IV
8.00 p. m., open ....I and VI
10.00 p. m., close ....I and VI

AUGUST.

1. 8.30 a. m., open ....I and VI
10.30 a. m., close ....I and VI
2.45 p. m., open IV
4.45 p. m., close IV
8.45 p. m., open ....I and VI
10.45 p. m., close ....I and VI
2. 9.00 a. m., open ....I and VI
11.00 a. m., close ....I and VI
3.30 p. m., open V
5.30 p. m., close V
9.30 p. m., open ....I and VI
11.30 p. m., close ....I and VI
3. 10.00 a. m., open ....I and VI
12.00 m., close ....I and VI

I....Chestnut street.
III....Limehouse street.
IV....White Point Garden.
Gate No. V....East end Calhoun street.
Gate No. VI....Lucas's Mill Pond.

NGINEER'S OFFICE, *July*, 1878.

In order to give as much time as possible to the sewage to pass out, each for flushing must remain opened until the next flood tide rises to the level in bottom.

rs opposite I and VI indicate the hours before and after the high tides.

rs opposite III, IV, and V indicate the hours before and after the low tides.

State from the epidemics of yellow fever and other diseases." Under th
intelligent commission was appointed, which has done much excellent work,
ing a large portion of the swampy region, marked in the map "Spinsfield pl
lying on the eastern flank of the city, comprehending several miles square,
on the Ogeechee Canal, and extending to the river; and Teynac and Cuyle
on the southeastern border, converting the lands into dry culture, and lesse
said, the ratio of malarial diseases.

The general plan of the city of Savannah is too well known to require
description. Its broad streets and beautiful squares at every alternate crossin
with magnificent trees, festooned with moss, have been so often described
ured as to require mention only, because they seem to have monopolized and
attention from less attractive but much more important conditions in relation
health. Between and intersecting these magnificent streets and squares an
of the houses which front upon them are an equal number at least of nar
many of them sunless by reason of the high walls which inclose the back ya
they bound. Into these narrow lanes open the stables, the back-yard drain
kitchen gates, for the convenience of filth-throwing of every conceivable ki

Of pavements there are none worthy of the name. A few only on the
streets consist of broken stone to facilitate cartage, but none which will
shed the surface water or prevent the absorption of filth. The sidewalks ar
better—badly laid out, of poor material. A porous sandy surface is the comm
tacle for every species of filth. And in the midst, all over the city, at the m
nent crossings and corners of both streets and lanes, street pumps are conspi
of them, on the last report to the mayor, and these only 15 to 20 feet deep—
enough to catch and suck up the first subsoil drainage saturated with the fil
age of the overloaded sand. Within the walled inclosures in the back yard
more than as many more pumps, in still more dangerous proximity to th
sink waters, and, on an average, of about 25 feet distance from the privy v
these vaults there are at present estimated to be no less than 4,000 throughou
laid in brick without cement, leeching their liquid contents into the soil and
water and filling the air with foul emanations. And thus it has been with
for a century. As an example of the relations of a pump to a deadly
hood—while making this inspection, accompanied by one of Savannah's ab
cal practitioners, and over one of the most fashionable drives, as we
ing through the toll-gate on Thunderbolt road—my companion pointed
field now under dry culture a quarter of a mile off, and observed that whe
demic of 1876 fell upon the city that field was under wet culture and at
under water; "and here," said he, "within 200 yards of this gate, sevente
died of yellow fever." Running my eye over the number of houses in view,
"Doctor, that means not less than seventy cases; all the people about here
had it, and there must have been some other cause besides that wet culture;
would not give yellow fever." My companion had been a member of the
cil, and had been active in the promotion of drainage—so active in it that h
have given but little consideration to any other cause of unhealthfulness.
his effort to convince me of the sufficiency of wet culture by suggesting that
of the terrible fatality in that particular neighborhood was probably still in
and volunteered to search for it; and, with that object in view, insisted on
The toll-gate is under an arch—on one side the office and on the other a
dwelling, these last bounding two sides, at right angles, of a yard about 25 fe
On entering from the road-side the conditions were at once apparent; at th
one side of the yard, separated by a picket fence from the barn-yard and po
(which were also separated from each other by a picket fence), was the pu
15 feet, respectively, from the house on one side and the privy on the other,
ing the line between the barn and poultry yards and the house-yard. The
strewn with surface filth, was moist with kitchen slop-waters, and had evide
been cleansed. Besides the seventeen deaths from yellow fever around this
companion and the gate-keeper counted up among the families of previous
ers three, and their wives and two children, since 1871. The water-works, w
been in use about a dozen years, are situated near the river (see map), and
supply just at the outlet of the Musgrove Creek and Ogeechee Canal Sw
large sewers about 100 feet off (below) on one side, and the Central Railro
at which the New York steamships discharge cargoes, cleanse and load. Be
sewers and drains, which empty right at the place of the water-works inle
river, all the other sewers and drains of the city empty into the Bilbo Ca
outlet of the famous open sewer is into the river about a mile and a quar
those above described. The rise of the tide in the river at the water-wor
5 to 6 feet. During some period of every flood tide, therefore, the conte
Bilbo Canal are met at the mouth and flooded up to the place of inlet of
basins, adding to the mass of impurities of the sewers and drains constantly
at that particular point.

City Engineer's Office, City Hall,
Charleston, S. C., August 11, 1879.

Dear Sir: In reply to your question as to the number of miles of unpaved and paved road surfaces in the city, I have the honor to say, in reply, that there are of—

Earth streets	$37\frac{3}{16}$ miles.
Paved streets (bowlders)	$9\frac{4}{16}$ miles.
Planked streets (3 by 9 planks)	$7\frac{3}{16}$ miles.
Shell road	$1\frac{7}{16}$ miles.
Macadam (poor imitation)	$\frac{3}{16}$ mile.
Ballard block pavement	250 feet.

The quantity of lumber used during the last few years in the construction of planked roads is 2,686,950 feet (board measure), which decay rapidly and are always undergoing repairs. Additions are constantly made, increasing the evil. A great deal of moisture is retained by the planks themselves, and between it and the soil a continuous trap is formed, in which is received all sorts of deleterious matter, which must in soils so excessively damp be subject to rapid decomposition, particularly exposed as it is to the scorching rays of the sun during the months of July, August, and September. I need say naught about the dirt roads. You have seen the wasting upon the gutters of the side gullies from the lots, composed of soap-suds, refuse water, kitchen wash, &c. You have also noticed the character of stuff on surfaces of streets, sometimes overlooked by the scavengers.

Yours, very truly,

LOUIS J. BARBOT,
City Engineer.

Dr. A. N. Bell.

Key West, Fla., *August* 2, 1879.

Sir: By this mail I forward my sanitary report on Key West, also a package containing copy of the laws of Florida, quarantine regulations of this port and charts, of the harbor. I leave by next steamer for Fernandina.

Very respectfully,

W. H. ELLIOTT,
Sanitary Inspector.

Dr. T. J. Turner,
Secretary National Board of Health.

Report on Key West, Fla.

SANITARY CONDITION.

The city of Key West is situated on the western extremity of the island of the same name in latitude 24° 33′ north and longitude 81° 48′ west. On the north and west it is bounded by the waters of the bay. To the south the city extends about half way across the island, which at this point is about a mile wide. According to a census taken in 1875, the population is 12,000, of which number two-fifths are whites, mostly natives of the United States; one-fifth negroes partly native and partly from the Bahama Islands, and the remaining two-fifths Cubans, nearly all of whom are of mixed blood and dark complexion. The climate is mild in winter and not excessively hot in summer. The following table will show the record of the thermometer for the year 1878:

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Maximum	83	85	87	88	92	94	93	94	92	90	85	79
Minimum	54	55	59	65	70	74	73	76	76	66	63	55
Mean	66.3	69.6	73	77.6	80.5	84.4	84.9	85.3	82.6	78.6	73.7	68.1

Frost never occurs here and the vegetation is tropical in character.

The site of the city, elevated about 12 feet above the level of the sea in its southern part, slopes to the water on the north and west. The northern portion is level and consists of land made by deposits of refuse with a covering of coral limestone of which the island is formed. This level portion is subject to overflow of salt-water during the prevalence of gales.

Cistern water is almost exclusively used for drinking. This is tolerably pure but is impregnated with salt, especially after a gale. The well-water is brackish and in the made land vile in taste and smell.

The drainage is necessarily on the surface, and such as is provided by nature with the exception of one large ditch, covered with pine plank. Into this empty two smaller cross ditches mainly open. Owing to the lack of any system of grading, water collects in several low places and is at times the cause of sickness. As the soil is very porous this condition of things lasts only a short time after the rains. The streets are smooth and tolerably clean. The side-walks rough, not much used, and overgrown with grass.

The habitations are mostly of wood, a few of coral limestone, and all without fire-places, except for cooking. The houses of the better classes are surrounded by spacious grounds in which the cocoanut, date-palm, tamarind, and many other tropical products abound. Among the poorer classes, notably those of the Cuban and negro populations, the houses are small, crowded together, and densely packed with inmates. Garbage is required to be deposited once a week in boxes or barrels in the streets for removal by city carts. This is sold to parties who use it for the purpose of making new land on the north face of the city. In regard to excreta, the privy system prevails in its worst form, as no ordinance requires the emptying of these nuisances. Frequently, too, excreta are simply deposited on the surface of the earth, exposed to sun and rain. The air and well-water are both contaminated from this source and from neglected garbage. Burials cannot occur without a permit from the city physician. The permits are filed away, and a record of deaths has been compiled from them from 1872 to 1876 inclusive by the keeper of the cemetery. This record gives the name, date, nativity, age, cause of death, and name of the attending physician. Part of this record is illegible. I have tabulated the statistics for the year 1876, which would seem to give a fair idea of the causes of mortality in the years free from epidemics. In 1875, when yellow fever prevailed as an epidemic, the number of deaths was 271, of which number about 40 were due to yellow fever. A reference to the table will show the greatest mortality due to phthisis and among the Cuban population. This is thought to be due to inhalation of dust in the manufacture of cigars. The diseases classified as fever and enteric fever are slow continued fevers, unaccompanied by lesion of Peyer's glands, and I think should be considered as "bastard typhoid fever" (see lecture of Dr. Alonzo Clerk, in Medical Record, April 20, 1878). The large mortality among children is due to the employment of ignorant midwives, neglect, improper feeding, and general unsanitary condition of houses and yards. As the record shows, Key West is remarkably free from periodical fevers.

QUARANTINE SYSTEM AT KEY WEST.

By a law of the State of Florida, approved March 11, 1879, the mayor and aldermen, with the city physician, constitute the board of health, and are empowered to enact quarantine regulations. Copies of the law and regulations are forwarded with this report (page 101).

In this city the offices of city and port physician are filled by one individual, who also holds other offices under the State. The election is annual, and the salary of the officer is just now the subject of a dispute between him and the city council. The officer claims the fees (which are collected by himself, and amount to about $3,000 per annum), and the last resolution of the city council provides that the salary shall be at the rate of $100 per month. The officer resides in the city, is allowed to practice his profession, and his official duties would not stand in the way of his attending contagious or infectious diseases in the city. The quarantine buoy which marks the boarding station is one-fourth of a mile from the west face of the city. Vessels are ordered to come to anchor on the farther side of this buoy and signal for the port physician. In practice this order is frequently disregarded, vessels merely signaling when passing the buoy, proceeding near or even up to the wharfs, where they are boarded by the officer. As far as I have been able to learn the examination frequently amounts to no more than inquiry of the captain as to the present state of health of all on board. Should the answer be "all right," pratique is immediately given. The regulations of this port do not require inspection of the log, mustering crew and passengers for examination, nor is it the custom.

The quarantine station is near Fleming (popularly known as Mangrove) Key, situated 1 mile north of the city. The only available channel to this station is that in front of the wharves. Should an infected vessel (none are considered infected here unless sickness prevails on board at time of arrival) arrive she is ordered to the station and kept there as long as the officer considers necessary. The sick are attended on board by the officer, thus keeping up frequent communication between the infected vessel and the city. The well also are kept on board, as there are neither hospital nor quarters of any kind at the station. I am informed that partial fumigation and disinfection are sometimes performed upon infected vessels. Five or six days after the recovery of the last case of sickness aboard the vessel is given pratique. In a word the system is one simply of detention, a useless tax on commerce, and totally inadequate to protect the city against the importation of disease.

The commerce of Key West consists, first, in the export of live fish to Havana and return cargoes of fruit and tobacco. This trade is carried on exclusively in small sailing vessels, and the time occupied in the passage is from 12 to 24 hours. The crews of these vessels are natives of Key West and thoroughly acclimated. The existence of yellow fever as an epidemic at Havana entails no detention at quarantine unless some of the crew are sick at the time of arrival.

Secondly, this is a port of call for steamers engaged in the cattle trade, which ply between Havana and the west coast of Florida; also for steamers running between New York and Galveston and between Havana and New Orleans. Besides, vessels frequently call here for orders or repairs, and there is a considerable coastwise trade. In fact, the character of the commerce is such that Key West is constantly exposed to the liability of infection, and admirably located to distribute the poison to the Atlantic and Gulf ports. A reference to the tables below will show this more particularly.

Foreign arrivals Key West, 1878.

	From Cuba.			From other ports.		
	Vessels.	Crew.	Passengers.	Vessels.	Crew.	Passengers.
First quarter 1878	44	460	26	18	157	351
Second quarter 1878	66	885	53	12	123	216
Third quarter 1878	93	968	182	12	105	196
Fourth quarter 1878	67	620	195	15	161	215
	270	2,933	456	57	546	978

Domestic.

Date.	Arrivals.					Clearances.				
	New Orleans.	Gulf.	South Atlantic.	North Atlantic.	Total.	New Orleans.	Gulf.	South Atlantic.	North Atlantic.	Total.
1878.										
January	3	2	......	6	11	4	4	1	2	11
February	2	3	......	7	12	2	3	......	6	11
March	2	5	......	9	16	5	5	......	3	13
April	4	5	......	6	15	5	3	1	6	15
May	8	13	......	8	29	10	7	1	7	25
June	8	13	......	10	31	5	17	......	6	28
July	5	6	1	5	17	5	8	......	4	17
August	4	5	......	1	10	2	2	......	5	9
September	4	......	......	4	8	1	......	......	3	4
October	3	1	......	3	7	2	7	1	2	12
November	3	5	1	6	15	4	5	......	5	14
December	4	5	......	5	14	5	8	1	5	19
	50	63	2	70	185	50	69	5	54	178

II.—RECOMMENDATIONS AND ESTIMATES.

1. *Boarding station and anchorage.*

The proximity of Key West harbor to the open ocean on the south renders the space for the location of a quarantine very limited. It is about 6 miles from the city to the line of outer reefs, which serve as a barrier against the waves of the gulf stream. Within this line the anchorage is safe at all times for large vessels, but in the hurri-

REPORT ON FERNANDINA, FLORIDA.

QUARANTINE AND ACTION OF THE LOCAL BOARD OF HEALTH.

The ordinance for the regulation of quarantine was enacted by the board of health April 30, 1879. The duties are performed by a medical officer who is at once port physician and inspector. The election occurs annually in April, at the first meeting of the board of health subsequent to its organization. The fees provided by the ordinance constitute the salary. The officer is allowed to reside in the city and practice his profession. The present incumbent is Dr. W. H. Pope.

The quarantine establishment consists solely of a boarding station designated by a yellow flag hoisted at the end of a wharf. This station is located on the west shore of Amelia Island, half a mile north of "Old Fernandina," and a mile and a half distant from the city of Fernandina.

Coastwise steamers are allowed to come up and are boarded at the city wharves; all other vessels are examined at the boarding station. In regard to the method of purification of vessels Dr. Pope informs me that, in addition to thorough scouring with disinfectants, he is in the habit of using "chlorine for the hold, and burning sulphur in the cabin and forecastle in the proportion advised by the National Board of Health. The proportion of chloride of lime and sulphuric acid for vessels of ordinary size is sulphuric acid one pint to two pounds of chloride of lime, using more for ships of larger capacity." The sulphur is used in the form of "flowers," which is ignited by being thrown upon burning charcoal in pans.

No record of vessels visited or their sanitary condition or past history is kept.

The quarantine ordinance above mentioned remained in force till July 23, 1879, when the rules and regulations of the National Board were adopted. Some time prior to this, anxiety began to be felt lest yellow fever should slip through the quarantine. The feeling increased until it seemed to pervade nearly the whole community. It was due to a widespread belief that yellow fever in 1877 was due to importation under practically the same quarantine administration as at present, to unsoundness in the views of the quarantine officer in that he considered the epidemic of 1877 of local origin, to a want of confidence in the character and extent of the purification of vessels in quarantine, and, lastly, in the lack of hospitals and other appliances of a proper quarantine establishment. The feeling culminated in a petition to the board of health to make the quarantine ordinance more stringent in regard to the classes of vessels specified in sections 4 and 5. This petition was signed by 31 individuals and firms, representing the intelligence and wealth of Fernandina. The proposed change in the ordinance would affect adversely the interests of the port physician and pilots, in a diminution of fees, and the dealers in lumber in increased rates of freight—vessels from southern ports "offering" at lower rates than others. The change was opposed by the port physician on the alleged ground that it was contrary to the rules and regulations of the National Board. Some of the lumber dealers signed the petition and the others made no opposition.

At a meeting of the board of health, held August 7, 1879, the quarantine ordinance was amended as follows:

"Be it ordained that sections 4 and 5 of an ordinance entitled 'An ordinance to regulate the quarantine,' approved April 30, 1878, be amended to read as follows:

"That during the season of quarantine no vessel arriving from an infected port or place where contagious or malignant diseases exist, or from any or either of the ports mentioned in or referred to by section 6 of said ordinance, and no vessel upon which there shall be found any disease of an infectious or malignant character, or upon which there shall have been such disease since the departure of such vessel from her last port, shall be permitted to leave the quarantine ground to approach the city of Fernandina until the occurrence of frost, and quarantine shall be declared removed by the board of health of said city: and any vessel which, within thirty days prior to her arrival, shall have held communication with any ship or vessel upon which there existed at the time diseases of an infectious or contagious character, or with any ship or vessel from an infected port, shall be quarantined fifteen days and fumigated before being permitted to approach the city. This ordinance to go into effect from the date of its approval, and all ordinances and parts of ordinances in conflict with the provisions of this act are hereby repealed. Rules waived and ordinance passed in council August 7, 1879."

This change in the ordinance amounts to exclusion of the classes of vessels mentioned, but it will work comparatively little injury to the commerce of this port. The action of the board of health seems to be at variance with the spirit of the rules of the National Board in making a too general application of the term "infected" and in substituting *detention* of vessels in place of *discharge* and *purification*.

It is, however, zeal in the right direction, and is warranted by the present imperfect condition of the quarantine at this port. The municipal authorities and this community are anxious to have the co-operation of the National Board in the establishment

Wilmington, N. C., at which place please make my next post-office
schedules received.

I have the honor to be, respectfully, yours,

A.
Quaran

Dr. T. J. Turner,
Secretary of National Board of Health, Washington D. C.

Wilmington, N. C., *A*

Sir: The quarantine establishment of this port consists of an ex
building, equal to twenty beds, well situated in an isolated place abo
Smithville, 31 miles from Wilmington, on the east bank of Cape F
quarantine physician resides and does his boarding from Smithville, a
river a little less than half the distance from his residence to the ho
distance from the shore, where vessels subject to his visits are requi
anchor. The anchorage ground for infected vessels is on the west si
channel, opposite the hospital, and need not be approached by passin
than three-quarters of a mile. As a place of detention of well persons
sity available space exists in abundance for the erection of tents on
river between the hospital and Smithville, and sufficiently distant fr
as from any other population. For a quarantine warehouse or shed
venient place except at large expense for the construction of a wha
the width of the shoal-water from any ground high enough to the chan
sity of discharging cargo in quarantine at this port, therefore, would
of lighters or flats, which are sufficiently abundant to be economical.
place of residence of the quarantine physician, is a town of nearly a t
itants, and a place of resort from Wilmington during the quarantine
conditions exist at this place of such a character as to render it very
tion if in communication with infected vessels, involving great care o
quarantine physician in regard to his boatmen. This care, he assures

The prohibiting regulation enacted by the city council, signed by t
ent of health, appended to the quarantine regulations of the quaranti
consulting physicians, has given rise to just cause of complaint by the
I am assured, after conference with some of the authorities, this unne
restriction will probably be abrogated at an early meeting of the co
rules and regulations recommended by the National Board of Health
and their spirit, in the future, acted upon. I have been very heartily
by both the public authorities and citizens, just at the beginning of
istration under the "New Hanover County board of health," which is
old, and my visit promises to be a fruitful one. It has rained daily,

sea. East of the city the country is rolling. The soil is clean sand, in which the live oak, cedar, olive, date-palm, orange, and banana flourish. At an average depth of 10 feet below the surface a stratum is reached, dark brown in color and the consistency of soft brick. It seems to be sandstone in process of formation. The water supply is chiefly from wells which seldom extend into the sand stratum. The water is contaminated with sewage and not free from salt. A few residences are provided with cisterns. The drainage is mostly on the surface. Three covered sewers exist—running west to the river—one of glazed earthenware pipe, which serves only to discharge the sewage of the principal hotel; the other two, of porous concrete, carry off the rainfall. The above-mentioned extension of marsh was formerly subject to overflow of spring-tides. The stagnant water left by them was rendered brackish by the fresh water constantly oozing from the slopes of the margin, and proved a fertile source of malarial fevers to those living adjacent. The tides are now excluded by a breakwater provided with a lock, while drainage is effected by open ditches. The former is indicated on chart by a red line; the latter by blue.

There is a special provision by ordinance for the removal of garbage. The waste from kitchens is generally carried out of the city by private individuals and used for feeding hogs. In regard to excreta, the privy system prevails. Formerly vaults were in use. They are now filled up with earth, and deposits made either in boxes or on the surface of the ground. The city scavenger is required to empty the privies monthly, and remove the contents at least one mile beyond the city limits. There are several cemeteries, and, besides, burials occasionally take place in private lots. No permit is required and no records kept.

By the State law the mayor and aldermen, with the city physician, constitute the board of health. This body has confined its functions to the regulation of quarantine. Its action has been guided by political rather than sanitary considerations, and its management of the city finances has not been of a character to inspire the community with confidence in the economy and propriety of its appropriations. Local sanitation has been under the charge of a sanitary committee selected from the city council and citizens. No interest was taken in sanitary matters, and the committee led merely a nominal existence till the disastrous epidemic of yellow fever in 1877 aroused the community to a sense of the danger of their neglect. Under these circumstances, the municipal authorities were induced to pass an ordinance changing the sanitary committee into a board of sanitary improvements, and clothing it with new powers. These are set forth in the ordinance, a copy of which is appended.

The city physician is merely the sanitary adviser of the board, and receives no compensation for his services. The present incumbent is Dr. J. D. Palmer. The supervisor mentioned in section 10 of the ordinance is the sanitary inspector. He is required to make reports and see that the regulations of the board are complied with.

As no mortuary record is kept, I cannot state what are the prevailing diseases. Since the improvement in drainage the city has been remarkably free from malarial fevers. Yellow fever has occurred but once—in the year 1867—when it was imported. The evidence on this point can be found in the able report of the late Dr. C. W. Horsey, published in the "Proceedings of the Florida Medical Association, session of 1878."

In conclusion, I would say that the residences in Fernandina are surrounded by spacious grounds planted with beautiful trees, streets spacious and clean, drainage in fair condition, and general sanitary condition decidedly above the average.

Respectfully, &c.,

W. H. ELLIOTT,
Sanitary Inspector.

FERNANDINA, FLA., *August* 30, 1879.

FERNANDINA, FLA.

AN ORDINANCE concerning the construction of drains to secure the health of the city.

SECTION 1. *Be it ordained by the city council of Fernandina*, That the sanitary committee be, and they are hereby, constituted a board of sanitary improvements to construct drains and otherwise improve the low, marshy grounds of the city in as substantial and permanent a manner as they may deem fit, and as the city council from time to time may direct.

SEC. 2. The aforesaid board of sanitary improvements are particularly desired to make the following improvements for the year 1878, and have the same constructed during the present winter months:

ARTICLE 1. To deepen the ditches and take up the wooden drains through the marshy grounds between Center and Ash streets from the eastern boundary of Fourth street to the river, and either lay pipe or tile drains of suitable dimensions to drain the low grounds in that locality.

ART. 2. To construct a pipe or tile drain on Beech street from near Fifth street to the river, with side drains from cross-streets, to drain the marshy ground in that locality.

ART. 3. To take up the wooden drains on Center street, deepen, and make a more efficient drainage on said street between Eighth street and the river.

ART. 4. To clean out and open the ditches in the park; lay a pipe or tile drain across Center street from the south side of the park to connect with the main trunk on the north side of Center street; also clean out the main ditches and side drains from Ninth street, near Colonel Taylor's, down through the gully, and repair the floodgate of Escambia street.

SEC. 3. And inasmuch as the city has no available funds on hand to pay the cost of the improvements designated, it is hereby ordained that the sum of twenty-five hundred dollars be, and the same is hereby, appropriated and set apart out of the revenue of the city for the year 1878, for the use and to the credit of the sanitary committee in making said improvements.

SEC. 4. And for the purpose of raising the ready means to pay for the said improvements at the lowest cash prices, the said board is hereby authorized to open a subscription list, and raise by subscription the necessary funds to pay for the same, and pledge the foregoing appropriated amount of taxes for the year 1878 for the repaying of subscriptions, with interest.

SEC. 5. Subscriptions shall be received on a cash basis; but said committee may receive payment thereof either in cash, material, or labor, as they may deem expedient. Voluntary contributions, either in cash, material, or labor, or trade, may also be received by said committee in excess of the loan.

SEC. 6. The board may appoint one of their members as treasurer of the board, to whom all such subscriptions for the contemplated relief fund shall be paid; and when so paid in, either in money or kind, the subscriber shall receive a certificate to the following effect, viz:

"CITY OF FERNANDINA, ———, 1878.

"This is to certify that ——— ——— did subscribe and pay to the board of sanitary improvements of Fernandina the sum of —— dollars, to enable them to make certain improvements contemplated in an ordinance approved January 15, 1878, which amount is secured and will be paid out of the revenue of the city for the year 1878, in cash, on or before the 1st day of February, 1879, with interest from date; or these certificates shall be received by the tax-collector in payment of cash levied for the purpose; which certificate shall be signed by the chairman and the treasurer of said board and be countersigned by the mayor, and the city seal attached thereto."

SEC. 7. The sanitary committee shall report to the city council on or before the first meeting in April next the amount of certificates issued under this ordinance, together with the amount of interest required to be raised for the same, and thereupon the city council will make and add such additional appropriation for the assessment of taxes for the year 1878 as may be necessary to provide for the payment of said interest; and for the purpose of meeting the payment of said certificates when due, it is hereby further ordained that the amount so appropriated and set apart from the taxes of 1878 be paid over to the treasurer of the sanitary improvement board by the tax-collector out of the money collected by him, and as fast as collected, when due. The certificates when redeemed shall be canceled by the treasurer of the board and by him reported to the city council.

SEC. 8. *Be it further ordained,* That the owners of city lots in and about the neighborhood of the contemplated improvements, whose lands are low and wet, shall drain the same either with open or covered ditches, connected with the nearest main drain, or fill up the ground, as the board may direct; and it shall be the duty of the sanitary committee, by its chairman or agent, to notify the owner or owners of such lots to drain them as designated; and upon refusal or neglect to comply with such notice, or in case of the absence of the owners of such lots, the said board shall make the same at the lowest cash price and charge the cost thereof to the owner of such real property; and the amount of cost, if not paid by the owner of such real property, shall be made subject of a special assessment on said premises and be collected with other taxes.

SEC. 9. The said board of sanitary improvements is further authorized to employ any sum which may remain unexpended after the completion of the improvements hereinbefore mentioned, in constructing drains in the streets between Beech and Calhoun streets, Third street, and the river, so as to carry off the spring water and rain water accumulating in the soil, and to require the proprietors of such adjacent lots as may need drainage, to have the same drained into the street drains or have the same done at their expense, as provided for in section 8.

SEC. 10. The said board of sanitary improvements shall be authorized to employ or accept the volunteer services of an experienced engineer (civil) who, under the direction of the board, shall survey, lay out, and superintend the construction of the improvements herein contemplated, and who shall be authorized to employ the necessary assistance for the surveys at reasonable rates, and also to employ, with the approval of said board, a competent supervisor of the hands employed in the construction of said improvements at a salary not exceeding $3 per day of actual service, to be paid by the board out of the funds provided for in this ordinance; and the said board is authorized to employ the services of the said supervisor of hands or some other suitable person as their agent in keeping the improvements herein provided for, after their completion, in good order, and for such other sanitary measures as they may deem necessary, at a salary of not more than $2.50 per diem of actual service.

SEC. 11. The sanitary committee is further authorized to select and, with the approval of the city council, appoint a practicing physician of the place as health officer of the city, whose advice and direction the committee shall take in all sanitary measures of the city, and to adopt such other and further rules and regulations as they may deem necessary and expedient in accomplishing the work contemplated by this ordinance.

SEC. 12. All ordinances or resolutions of the city council heretofore adopted and which are in conflict with the provisions of this ordinance are hereby repealed and abrogated.

A SUPPLEMENTAL ORDINANCE to an ordinance concerning the drains to secure the health of the city.

Be it ordained by the city council of Fernandina, That the following supplemental ordinance on construction of drains to secure the health of the city, approved January 17, 1878, is hereby approved:

SEC. 13. Whenever it becomes necessary for the sanitary board to raise the requisite means to pay the costs for draining private property under section 8 of said ordinance, the board may borrow money and pledge the special-tax assessment on such lots for that purpose, with interest, such interest to be calculated and added in the assessment of said tax, and made payable on or before the 1st day of March next following, the board to issue a certificate to that effect, which certificate shall be signed by the chairman and the treasurer of the board.

SEC. 14. *Be it further ordained*, That from and after the passage of this ordinance all sinks, well privies, within the corporation, be abolished, and the people required to establish and use water-closets or boxes, whereby the human excretal matter can be cheaply and frequently removed to a safe distance; and it is hereby made the special duty of the sanitary board to attend to this sanitary measure and carry the same into operation. And it is hereby made the duty of the people to fill up, clean out, and remove their well privies and erect water-closets or earth-closets with or without dry boxes in the place of the well privies, and remove all excretal matters at such times and in such manner as the sanitary board may require, upon due notice being given in writing, upon the neglect or refusal of which the person or persons so refusing or neglecting shall be brought before his honor the mayor, and, if found guilty, be fined not less than three nor more than ten dollars, and in addition to such fine such well privies or uncleaned closets shall be declared a nuisance and be adjudged to be removed by the marshal at the expense of the owner; the expense of removal shall be added as costs in the case.

SEC. 15. The said sanitary board is further authorized and instructed to grade, clean out, and drain all the street gutters within the city and to keep the same in repair, so as to drain off the rain-water and prevent pools in the city.

SEC. 16. The said sanitary board is further authorized and instructed to have all kitchen slops and laundry water removed and disposed of, and establish such rules and regulations for such removal as said board may deem best. And any person first being duly notified in writing to comply with the rules of said board shall be brought before the mayor, and if found guilty shall be fined not less than one nor more than five dollars.

SEC. 17. It is further ordained that the present members of the sanitary committee, together with the engineer and the city physicians, shall constitute the sanitary board and continue to act as such during good behavior in office or until removed by the city council with the approval of the mayor; and whenever any vacancy occurs in said board by death, resignation, or otherwise, the remaining members of the board, by and with the approval of the mayor, shall fill such vacancy.

SEC. 18. It is also ordained that whenever any epidemic shall again come upon our city the sanitary board shall be authorized to augment their members to a sufficient number required to take charge of and manage the entire sanitary affairs of the city, and to bring relief to the suffering people; said sanitary board to be empowered and authorized to receive contributions and aid from others and apply the same in bringing relief to the suffering people from such epidemic.

SEC. 19. It is farther ordained that the mayor of the city shall, *ex officio*, be the president of the sanitary committee and have a supervisory power over the actions of the board.

Approved March 5, 1878.

JACKSONVILLE, FLA., *September* 18, 18

SIR: Inclosed please find report on quarantine with recommendations for perm quarantine establishment at the above port.

On the the 16th instant I communicated to the president of the board of heal Jacksonville from the memoranda forwarded from your office, August 27, such par as are intended for the guidance of municipal authorities and physicians.

By same mail as this letter one package containing chart of harbor and quara regulations.

Very respectfully,

W. H. ELLIOTT.
Sanitary Inspect

DR. T. J. TURNER, *Secretary*.

REPORT ON QUARANTINE AT JACKSONVILLE, FLA.

At this port quarantine goes into effect annually on the 1st of May, and lasts the 1st of November. A copy of the regulations in force at the opening of the s is appended:

On the 23d of July the "rules and regulations" of the National Board were ado

On the 8th of August the board of health passed the following:

"*Be it resolved by the board of health*, That pilots and boat crews bringing ves any kind into the port of Jacksonville shall remain on board until the vessel is vi by the port physician, and in no case shall they leave without the permission o port physician, under a penalty of twenty-five dollars."

And on the 11th of August, the following:

"*Be it resolved*, That from and after this date no vessel coming from the West In Islands and tropical ports of South America shall be allowed to enter the harbor o Saint John's River till further orders."

The adoption of the rules of the National Board left all existing quarantine re tions in force, except that portion of section 6 which declared any foreign or Ame ports south of Florida "infected," without any regard to the existence or non-exis of contagious or infectious diseases at those ports.

The action of the board, on the 11th of August, in effect re-enacts this broad a cation of the term "infected" and establishes a non-intercourse quarantine as re the ports designated in the resolution. In taking this action the board failed to ceive that it was not in accordance with the rules of the National Board. The p dent informs me that the board of health desires to co-operate with the Nat Board, and that the above resolution will be repealed if it is requested. In vie the fact that the obstruction to commerce was expected to last only till Novemb and that no accommodations were provided at the quarantine station, I declined ing the request.

The quarantine establishment consists of two boarding stations, one of whi located at Jacksonville and the other at Mayport. The village of Mayport is situ on the south side of the mouth of the Saint John's River, about 25 miles below J sonville. The estimated population is 150. To the eastward along the beach th a row of buildings known as "the cottages," which serve as a summer resort for v ors from the city. During the season, the occupants will number about 200. On north bank of the river is Pilot Town, containing about 75 inhabitants.

The boarding station is just in front of the village of Mayport, and its limit designated by two yellow flags, one on each of the wharves, distant about 300 apart. The channel at this point is rather narrow for large vessels to swing in. hospitals or accommodations of any kind are provided. The port physician, Dr. Weldon, occupies one of the residences in the village.

The channel over the bar of the Saint John's River is narrow, crooked, and const shifting. Vessels drawing 12 feet can enter at high tide in the daytime. Abo miles up the river is Dame's Point; just abreast of this is a shoal which can be p by large vessels only at high water. The same tide that brings vessels over th will serve for the shoal at Dame's Point, provided there is no delay between the points. A delay of a few minutes might entail the loss of 24 hours by a vessel, u the risk of passing the shoal at night was taken. This to steamers is a serious sideration. To obviate the difficulty, I have suggested to the port physician the priety of making his examinations of large steamers while in transit, only dela them long enough to board and leave them.

About 2 miles above Mayport the Sisters River opens into the Saint John's. is the inland route from Fernandina, and is traveled only by small boats, and a week by a light-draft steamer plying between Savannah and the Saint John's R above Jacksonville. In section 5 of the quarantine regulations, it is provided tha boarding station for vessels coming through the inland route shall be "near the c and that examinations shall be made by the city physician. As a matter of fact, the spot designated is in the city, and so is the residence of the city physician.

The Saint John's River is the only route by which persons and baggage from vessels wrecked on the east coast of Florida can reach Jacksonville. The average number of such wrecks is five annually, and nearly all of them are from ports liable to infection of yellow fever. All arrivals of persons and things from wrecked vessels are subjected to quarantine examination at the station in Jacksonville above mentioned, to reach which they have to pass nearly the whole length of the city front. This is objectionable, and some point above the city should be selected for inspecting suspected arrivals from the upper Saint John's.

The average number of arrivals at the port of Jacksonville is 275 per annum, 30 being from foreign ports, and the balance from domestic. Foreign arrivals are all from ports south of Florida.

Vessels arrive in ballast and carry out cargoes of lumber, the only exception being an occasional fruit vessel from the West Indies.

As all entries from ports south of Florida are prohibited, and no yellow fever exists along the Atlantic coast, there is no danger of the importation of the disease. The authorities seem much interested in the subject of quarantine, and are anxious to have a properly equipped establishment. I am informed that the city of Jacksonville has no funds available for the purpose, and the authorities desire to receive the assistance of the National Board.

RECOMMENDATIONS FOR A PERMANENT QUARANTINE ESTABLISHMENT AT JACKSONVILLE, FLA.

In examining the chart of Saint John's River with a view to selecting a proper site for a quarantine establishment, the following considerations present themselves:

Mayport and Pilot-Town are naturally suggested first, being the places nearest to the bar where the anchorage is safe. The amount of the population at these places is an objection that cannot be gotten over. These villages are dependent upon Jacksonville for their daily supplies. In case of the importation of infectious disease not only would the inhabitants themselves suffer, but the difficulty of isolation would be very great. Another objection is the narrowness of the channel and rapidity of the current.

The next point that claims consideration is Fannin's Island. This is one of the group known as the Three Sisters, and is located about 1,000 feet north of the Saint John's River and 300 feet east of the Sisters River, from both of which it is separated by salt marsh. The island is about a fourth of a mile in its long diameter, and covers a space of 15 or 20 acres. On its eastern border is a shell ridge about 15 feet in height and 30 feet in width. The rest of the island is level at an average height of 3 feet above high water. It is covered with a fine growth of oak, palmetto, cedar, and other trees. Water is easily obtained by digging, but is not fit for drinking. The advantages of this site are that it is isolated by nature, and it commands the inland route as well as that up the Saint John's. The disadvantages are, insufficient room, the quarter for the well could not be removed from the hospital as far as is desirable. The site is inconveniently distant from the Saint John's River, rendering necessary a long trestle or causeway through the marsh. Its healthfulness is doubtful. I was informed that it was once occupied by a family whose members suffered considerably from malarial fever. From its lack of elevation and proximity to marsh it is infested with mosquitoes. The disadvantages are serious, and lead me to reject the site. I have been thus explicit on this locality, as the physicians in Jacksonville consider it the best site for a quarantine.

The next point for our consideration is Saint John's Bluff. This point is 20 miles by water below Jacksonville, and 4 miles above Mayport, on the south side of the river, and is part of the main land. It is bounded on the northwest by the river, the channel of which at this point is deep and close in shore. On the northeast the bluff is separated from the river by a marsh about a fourth of a mile in width. The bluff rises abruptly from the marsh to form a ridge about 60 feet in height; back of this there is a gradual slope down to a cedar hammock. The ridge extends along the northeast boundary to within 200 feet of the river, where it turns at right angle and runs parallel with the river for a quarter of a mile. The average height of the bluff above the marsh is 30 or 40 feet. Just at the point the current of the river is wearing away the bank at the annual rate of 3 feet, and somewhat faster higher up the stream. As the point of marsh below the bluff is making, it is probable that the rate of encroachment by the river will diminish or cease altogether. There is no habitation on the bluff, which is covered with a magnificent growth of live oak and hickory. The adjacent country is sparsely inhabited, and the absence of roads on the bluff show that people seldom pass over it. Water is obtained from a spring and is noted for its excellence. The advantages of this place as a site for quarantine are, exceptionally good sanitary condition, convenient proximity to the channel, and commanding view of the entrance to the river. As it is above the entrance of the Sisters River it guards the commerce

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REPORT ON SAINT AUGUSTINE, FLA.

SANITARY CONDITION.

Saint Augustine is situated in latitude 29° 53′ 30″ north, and longitude 81° 18′ 30″ west. The population is estimated at 2,500, of whom 1,000 are colored and the rest white. A considerable proportion of the latter are of Spanish and Minorcan descent.

The climate is agreeable at all seasons of the year. The mean temperature of the winter months is 58°, of the summer 80°. The average annual rain-fall is 32 inches.

The city is located on a peninsula of the main land, which extends southward between the San Sabastian River on the west and the Matanzas River on the east, both of which are salt. The former river takes its rise in a swamp, about five miles north of the city. This river is crossed by a causeway and bridge, near the western end of which is the terminus of the only railroad at Saint Augustine, and which connects it with Tokoi on the Saint John's River, 15 miles distant. The relative proportions of marsh and high ground are shown in the chart which accompanies this report.

The peninsula on which the city is situated is subdivided into two smaller peninsulas by the Maria Sanchez Creek, which extends as far up the city as the letter I on the chart in the word "Augustine." Communication across this creek is had by two causeways provided with culverts, through which the tide ebbs and flows. A considerable portion of the city drains into this creek, which in the rainy season contains brackish water.

Statements were conflicting as to whether or not the residents in the neighborhood of this creek were more liable to *periodical fever* than the rest of the inhabitants.

In the outbreak of yellow fever which occurred in November, 1877, most of the cases occurred in this neighborhood.

The soil of the city is pure sand, through which water readily percolates. The average elevation above the level of the sea is not over 15 feet.

The water supply is almost exclusively from wells, which in many cases are quite near the privy vaults; a condition of things which the foreign element of the population seem rather to prefer. A few of the residences are provided with cisterns.

The drainage is mainly on the surface. There are no sewers, with the exception of a short one extending from the principal hotel to the river front, and which is reported to be in a foul condition, and a sewer recently laid to drain a foul pond in the southeast quarter of the city, near the United States barracks. Near the northern limit of the city is a small canal, which extends entirely across the peninsula west from Fort Marion. The tide flows in and out from both rivers. If this canal and the culverts in the Maria Sanches Creek were provided with locks which would exclude the salt water, while giving free exit to the natural drainage of the soil, it would make a great improvement in the drainage of the city. This can be done at comparatively trifling cost.

The streets are narrow, most of them paved with shell, clean, and in good condition. The street on the city front is protected from encroachment of the river by the magnificent sea-wall which extends along the whole length of the city from Fort Marion to the United States barracks. This wall is 3 feet wide, built of cognina, and capped with slabs of granite 8 inches thick.

The direct line of the wall is interrupted at two points by small openings which lead into basins or docks, which serve for the anchorage of boats. These docks are rectangular in shape, inclosed by a diversion of the sea-wall, and the space they occupy is taken from the front street.

Two wharves extend out from the sea-wall. They are built on round, wooden piles, which offer little resistance to the free flow of the tides through them. The whole water front is clean, and the sanitary condition excellent.

Many of the habitations are built of cognina, which is quarried on Anastasia Island; but wooden buildings are gradually replacing them. The ordinances relating to the disposition of garbage will be found on pages 16 and 28 of the "compilation" which accompanies this report. The section of the ordinance requiring the cleaning of premises and placing garbage in front of them for removal by the scavenger is disregarded by many of the citizens.

In regard to excreta, the privy system prevails, and vaults are in general use. No ordinances require them to be emptied and disinfected.

The fish market is built of wood over a corner of the basin on Front street that is nearest to the center of the town. It is kept very clean. The general market is near by. The regulations in regard to them are good, and will be found on pages 12 *et seq.* of the "compilation of ordinances."

The cemetery belonging to the post lies near the water, just south of the United States barracks. The Roman Catholic Cemetery is in the northern part of the city, near the lower ground at the head of Maria Sanches Creek. Interments here are allowed only in vaults. West of Fort Marion, and just north of the canal above alluded to, is the Protestant Cemetery. All of these Cemeteries are full, and being within the city

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peninsula, flanked on either side by marshes subject to the overflow of the tides. The stratum of sand has an average depth of 10 feet, and beneath it is a layer of hard dark-brown material, which seems to be sandstone in a state of formation. To the northwest, and just beyond the limits of the town, is a low tract of several acres, known as the "Bay Swamp." This drains a considerable portion of the adjacent land, but contains water only in rainy seasons. It is drained by a large open ditch, which runs along the western border of the town to the river. The tide flows in and out of this ditch, so that it serves as a drain only half of the time. The water supply is exclusively from wells and pumps. Most of them penetrate only to the hard stratum, and must contain some swamp water; a few go into the brown material, and the water from these has a slight taste of sulphur. As most of the people are supplied from the street pumps, and as the streets and lots are spacious, the drinking water and the privies are farther apart than is generally the case where the two are found together. The drainage is effected by two open ditches; the soil is so porous that water quickly sinks from the surface, and the town is said to be exempt from periodic fevers. The streets are wide, generally overgrown with grass and weeds excepting a wagon-track in the center and a foot-path on each side; one side-walk is paved with wood and a few others with oyster-shells. The streets are kept clean and in excellent condition, but for the weeds; they are shaded by a magnificent growth of live-oak, cedar, and pecan trees. On the city front are six wharves, built of hewn pine logs, the spaces filled in with stones and earth. Two of them are in use and in good condition; the wood-work of the others is much decayed, and they are used to some extent as places of deposit for the refuse from the neighboring houses. At the west end of the water-front is a large pile of decomposing pine sawdust, and in front of this a decaying wharf, which retains much of the filth floated to it by the river. There, is, however, no evidence of disease caused by these things among the neighboring people. The houses are all of wood, mostly surrounded by spacious and shaded grounds. The privy system is in use, but there are no vaults; there is no ordinance compelling the cleaning of privies or removal of garbage. The cemetery lies to the west of the town in a beautiful forest; it has no keeper, and the burials are made without *permits*. No records of burials are kept, and there are no statistics of mortality. It is stated that there was but one interment during the quarter ending September 30, though the cemetery is used by the country people as well as by those of the town.

The board of health is created by the following ordinance of the city council, which can abolish the board, but cannot control its action. No provision is made for city sanitary expenses.

"AN ORDINANCE creating a board of health for the city of Saint Mary's, Ga.

"*Be it ordained*, That the health officer, health committee, and such other persons as they shall select, shall constitute a board of health for the city of Saint Mary's, who shall have power to make such rules and regulations as they think necessary for the preservation of the health of the city.

"*Be it further ordained*, That the health officer and health committee shall have power to elect three or more persons to act with them on the board of health.

"*Be it further ordained*, That the health officer is hereby declared to be president of the board of health.

"Passed in council July 21, 1879.

"J. M. ARNOW, *Mayor*.

"I. I. VOCELLI,
"*Clerk of Council*."

The quarantine establishment consists of two stations, and a medical officer, who is elected annually by the city council. The present incumbent is Dr. F. Barnard, who resides in the town, and is *ex officio* president of the board of health. The stations are only certain anchorage grounds, where vessels may lie in quarantine. The lower one is in Cumberland Sound, the upper one in the Saint Mary's River; no quarantine buildings are provided. The rules and regulations of the National Board of Health were adopted August 9, and have been enforced, at least as far as disinfection of ships is concerned. The commerce of the town is small, the average number of arrivals from foreign ports not exceeding one per month; the arrival of an infected vessel is a comparatively rare occurrence.

RECOMMENDATIONS FOR A PERMANENT QUARANTINE ESTABLISHMENT FOR SAINT MARY'S, GA., AND FERNANDINA, FLA.

In regard to the above subject, it is stated in the report on Fernandina, that the south end of Cumberland Island, designated as "Latam Hammock" in the plat of Dungeness Plantation was the most convenient locality for the establishment of a quarantine which would serve for the commerce of both cities. (See plat of Dungeness which accompanies this report, also coast survey chart with "report on Fernandina," and p. 98 of the bulletin.)

I have to report that the municipal authorities of Fernandina and Saint Mary's recognize the correctness of this conclusion. Neither municipality have any means available for the purchase of a site and the erection of the necessary buildings; nor is the annual number of arrivals at these ports sufficient to provide adequate compensation for an officer who will be required to reside at the station, and as a consequence have to relinquish private practice. In view of these considerations and for other reasons stated in the report on Fernandina, the municipal authorities of these cities petition the National Board of Health to establish and maintain a quarantine station on Cumberland Island, which shall serve to guard the commerce of both ports. They have also, by ordinances duly passed, delegated to the National Board all rights and powers over the quarantine heretofore vested in them. The petitions are forwarded with this report.

I respectfully urge upon the National Board the propriety of granting these petitions, not only for the reasons already stated in these reports, but for the following:

The management of the station by the National Board would serve as a good example and model in operation for the information and guidance of local authorities having control of quarantines. Should this quarantine prove effectual in preventing the importation of disease, while reducing the detention of vessels and interference with travel and traffic to a minimum, the effect would be to establish confidence in the rules and regulations of the board, while the facilitation to commerce would enlist the co-operation of captains of vessels in favor of quarantines so conducted. I am satisfied from conversations with this class of men, especially captains of coasting steamers, that they regard quarantines, as now conducted through the South by local authorities, oppressive, and consider the frequent examinations at every port unnecessary, and prompted rather by a desire for fees than regard for the public welfare. Again, under the control of the National Board the appointment of quarantine officials would be removed from the arena of politics, with all the attendant evils, of struggle for office, oftentimes attained by unworthy means; insecurity of place, because dependent upon the pleasure of city councils, themselves elected annually; and, lastly, the temptation to be guided rather by the popular will than by a sense of duty.

Finally, the establishment of this quarantine station by the National Board would not only be a step towards a uniform system of quarantine under one management for the whole country, but would increase the influence of the board with local authorities and promote the cause of sanitation generally.

Respectfully submitted.

W. H. ELLIOTT,
Sanitary Inspector.

SAVANNAH, GA., *November* 8, 1879.

HUNTSVILLE, ALA., *August* 23, 1879.

Dr. THOS. J. TURNER,
Secretary of the National Board of Health, Washington, D. C.:

SIR: I had the honor to receive from you under date of the 12th of June, a telegraphic dispatch inquiring if I would accept an appointment from the National Board of Health as quarantine inspector. Again on the 15th of June, I received your written notification of my appointment, bearing date also of the 12th, and inclosing oath of office, which last I executed in due form and returned. On the morning of the 22d, your letter of instructions came, assigning me to duty on the Gulf coast of Florida, from Key West to Pensacola. This letter which was dated on the 19th, reached me while I was in consultation with Dr. Bemiss, who had stopped in Mobile by resolution of the National Board to give me some verbal instructions, and who advised me to get to work as speedily as possible, and who thought that I had better commence my work at Key West.

On account of the quarantine at New Orleans, there was no regular communication between that place and Key West, so that when I learned that the steamer Chase was advertised to leave New Orleans for Cedar Keys, Key West, and Havana, on the 25th of June, I deemed it advisable to hurry my preparations, and left Mobile on the 24th, so as to be sure to arrive in time to take passage on her. Delay after delay occurred on account of some work that had to be done on the machinery of the ship, so that she did not leave her wharf until the evening of the 30th. She was detained for additional repairs twenty-four hours at Port Eads, and did not reach Key West until the night of the 5th of July. Two days was as much time as I cared to spend at Key West, but I was not able to get away until the 11th of July, the mail steamer Ocean Gem, the only regular medium of communication between Key West and Cedar Keys, having been disabled by an accident to her engine. I finally got away on the cattle steamer Ella Knight, bound from Havana to Manatee for a cargo of cattle. By traveling on this vessel I had the advantage of an opportunity to learn something of the Florida and Cuba cattle trade; and the disadvantage of making myself liable to twenty days detention at quarantine at either Tampa, or Cedar Keys. In the meantime there was no quarantine at Manatee, and I decided that if I could not obtain a relaxation of the rule, I would serve out my quarantine at that place.

I reached Manatee on the 13th of July, and left there on the 15th, in an open boat for Tampa, 43 miles distant, which place I reached on the 16th. It happened that the quarantine officer at Tampa had gone to town the night before, and had got drunk, for which he was sent to jail; and it was several hours before the authorities could supply his place. In this way I was able to pass the quarantine without question. I remained two days in Tampa, and left there on the 18th, on the mail steamer Cochran, for Cedar Keys, which place I reached on the 19th. Here I received my first mails. Here also I got the first definite news of the outbreak of yellow fever in Memphis; and believing that my proper place was where there was some earnest work to do, I telegraphed to Dr. Mitchell requesting him to have me ordered to that stricken city. I waited for an answer until the 24th, and receiving none, left for Saint Mark's and Apalachicola. To reach either of these places, it was necessary, either to hire a special boat, which I found would cost $30, and an indefinite amount of time on account of the uncertainty of the winds, or else to travel entirely across the State of Florida to Baldwin, and thence to Tallahassee, which last I preferred as the quickest and cheapest route. Reaching Tallahassee on the 25th, I determined to give Saint Mark's, which has dwindled to a little hamlet of forty or fifty person, the go-by. I was, besides, able to obtain all the information about it that I needed, at Tallahassee. Here I had to wait two days for a boat to pass down the Chattahoochee River, so that I did not get off until the 27th. I reached Apalachicola on the morning of the 28th, on the steamer Jordan; and left there on the night of the same day, and on the same boat for Eufaula *en route* to Pensacola, being obliged to make a circuit of some 500 miles, to reach my destination. I got to Eufaula on the night of the 30th, waited until next day for a train, and arrived at Montgomery on the evening of the 31st, the last day of the month.

In Montgomery I met the Alabama State board of health in informal session, and at their request paid a hasty visit of inspection to Opelika, where two refugees from Memphis had died with yellow fever; and here also on the 4th of August, just as the train was leaving for Pensacola a messenger handed me your telegram ordering me to Memphis. I therefore went to Mobile instead of Pensacola, and thence, on the night of the 6th, started to Memphis, which place I reached by way of Humboldt on the evening of the 8th. I left Memphis under orders for Mobile on the 18th. Mobile enforced fifteen days quarantine against Memphis. The only place I knew of where I had any chance of admission was Huntsville. I have accordingly come here to pass my quarantine; and I employ the first days of my detention to make to the National Board a report of my investigations in Florida and Alabama, and of my work in reference to the epidemic in Memphis.

It was my intention to have prepared my Florida report in Pensacola, but this was prevented by the orders that brought me to Memphis.

It may be proper for me to add that I hurried through my Florida investigations for two reasons, namely: (1) The several towns in my district are all of small population and of small commercial importance, so that it required very little time to get all the information needed in connection with them. (2) I knew that if the fever showed any disposition to spread into Alabama I should be needed at home.

After this long preface, which perhaps it was hardly worth while to write, I proceed to give account of my investigations and conclusions.

KEY WEST.

Key West belongs to the district assigned to Dr. Elliot, and I have therefore to consider it only in so far as it stands in relation to the other seaports scattered along the Gulf coast of Florida, the district covered by my own investigations. This does not require me to enter into minute geographical and other details. As is well known the island is of coral formation, and the soil is mainly composed of disintegrated coral limestone, with which is intermixed a little sand washed up from the sea, and a little vegetal matter resulting from the decay of the local vegetation. The soil is not deep but the organic matter retained in the coraline *debris* makes it productive. The flora is almost wholly tropical and is unlike anything else in the United States. It comprises the cocoanut palm, the date palm, the tamarind, the sapodillo, the banyan, and many species of cactus. The island is never visited by frost, and the houses have no fire-places or chimneys except for culinary purposes. In a word, in all of its climatic relations it approximates very closely to the West Indies, and it would seem that here, if anywhere within the limits of the United States, yellow fever might find a permanent domicile.

The population of the island, mostly resident in the city and its suburbs, is about

10,000, of whom more than half are Cubans and negroes. The Spanish language is quite as commonly spoken among the people as English. The place has been repeatedly visited by yellow fever. It is admitted that this is sometimes imported. For example, it was brought in last year (1878) from New Orleans by the Maria Frederika. But it is the almost unanimous opinion of the resident physicians that it is also sometimes of indigenous origin. I have not myself studied the medical history of the place sufficiently to venture the expression of any confident opinion upon this point. The epidemics which have occurred here have never attained very large dimensions. In the most extensive epidemic which has occurred since the war the number of cases was only 75, and the number last year was less than 40. The local physicians explain this by the statement that on account of the ethnological character and the antecedents of the people very few of them are liable to attack.

Key West is in commercial communication with Havana, New Orleans, Galveston, New York, Cedar Keys, and other American and West India ports. Its principal exports are fish, sponge, and cigars; its principal imports, tobacco and West India fruits. Through the medium of this commerce yellow fever has been imported into Key West on several occasions from Havana and New Orleans.

From Key West to Manatee along the Gulf coast of Florida there are only a few very small settlements, the best known being Punta Rassa, where there is a telegraph station and one or two other houses; and Charlotte's Bay, where there is a station for shipping cattle, but only a few scattered residences, not enough to constitute a village.

Throughout all this southern extremity of Florida the interior of the country is filled with swamps and everglades and is uncultivated. Cattle constitute the only article of export.

MANATEE.

Under this general heading I include several small settlements on both sides of Manatee River containing altogether some 400 inhabitants.

Manatee River, so called, is rather an arm of the sea, extending into the land about 12 miles, with a width of about 2 miles, and receiving at its head and in its course the waters of several creeks or small rivers. On its south side about 6 miles from its mouth is the village and post-office of Manatee, a straggling hamlet that may number something like 200 souls. Two miles below Manatee on the same side of the river is another post-office known as Bradentown, with some half dozen dwellings scattered around it; and between this and the mouth of the river are several other small settlements that remain as yet without names. On the north side of the river almost opposite Bradentown is the little village and post-office of Palmetto, which with the adjoining neighborhood is reckoned to contain about 70 or 80 inhabitants.

The country on the south side of the river is elevated above the water level from 20 to 25 feet. It is flat and sandy, the principal growth being the long-leaved southern pine, with an undergrowth of scrubby palmettoes. At the village of Manatee there are several small orange orchards, and the guava grows everywhere luxuriantly. The water is mostly obtained from shallow wells and from springs which flow out under the river bank. The country on the north side of the river is of very much the same character as that already described, except that the elevation of the shore line is much less.

The healthfulness of Manatee is considered to be well established, and it has some reputation as a winter resort for consumptives; although the number of health seekers visiting it is still small. Such cases of sickness as do occur are mostly malarial, and of mild type.

The commerce of the place is of course not large. Its exports consist of a few thousand oranges and a few shiploads of cattle gathered from the adjacent country, the cattle wharves being situated near the mouth of the river. The imports consist of a few groceries and dry goods—the groceries being mostly brought from New Orleans and the dry goods from northern cities via Fernandina and Cedar Keys.

There has never been any quarantine at Manatee, and it has had only one visitation of yellow fever that spread at all among the people. This occurred in 1867 under the following circumstances:

The steamer Southern Star was bought in New Orleans, in the spring of 1867, by Captain McKay, and placed in the Florida and Havana cattle trade, making three trips a month. She became infected with yellow fever some time in August, when there was both yellow fever and cholera prevailing in Havana and amongst the shipping in the harbor. The first case occurred in the person of Donald McKay, eighteen hours after leaving Havana, where McKay had been ashore. The day after the appearance of the fever the vessel arrived at Manatee. Her crew numbered fifteen all told, seven whites and eight negroes. All of the whites at once left the ship, leaving the negroes on board. Of the whites three left the ship sick, namely, Captain McKay, Captain Neal, and the engineer Green. Of the negroes, two had fever and one died. Captain McKay carried the fever to Tampa where he lived.

Captain Neal went to his home on the north bank of Manatee River, where he communicated the fever to his son, the rest of the family escaping. Both of the sick men recovered.

Engineer Green, who is said to have had yellow fever at New Orleans in the preceding year, started for Manatee in a boat, but died on the way up, and was speedily buried.

Colonel Fullmore, who lived in Manatee, on the south side of the river, visited Captain Neal during his sickness, and a few days afterwards was taken down himself and died. His wife and other members of his family who visited him had the fever. Altogether there seem to have been about a dozen cases, or perhaps as many as twenty. A drover named Milton Johnson went aboard the Southern Star at the cattle-pens soon after her arrival and remained to supper. He was taken sick with the fever at the pens, and rode on horseback to his home in Hillsborough County, a distance of fifty-five miles, where he died. No other cases occurred in this neighborhood.

It is easily seen from the foregoing sketch that Manatee stands in need of very little in the way of quarantine protection. It has so little and such infrequent intercourse with places where yellow fever is accustomed to prevail, that the danger of the importation of the disease is extremely small, and the population is so scattered that it ought to be easy to limit its extension even after it was brought in.

TAMPA.

The town of Tampa is situated at the month of Hillsborough River, on Hillsborough Bay, which last is a small inlet at the head of Tampa Bay. Tampa Bay is 10 to 15 miles wide and its length from its head to its entrance into the Gulf is about 40 miles. The town is a square, every side of which is a half a mile long, so that the corporate limits include 160 acres of land. The population is placed at 300 by Rand and McNally, but it is believed by citizens of the place to be considerably greater. The surface is slightly undulating and the surface drainage is good. Malarial diseases are rare. West of the town there are several small ponds. Some families of negroes live near these, but are said not to suffer from chills or other malarial troubles.

The water supply for about one-third of the population is obtained from wells; for the other two-thirds it is furnished by cisterns, some of which are built above and some below ground. There are no privy sinks; and in most instances no special receptacles for the night soil, which is simply allowed to fall on the surface of the ground under the privy seats. Once a week, under the orders of the city marshal, it is disinfected with sulphate of iron, and then removed and buried in the gardens. As in most Southern villages, the lots are large, with abundant shade, and the residences are wide apart.

The commerce of the place is not large. An occasional cargo of cattle is shipped to the West Indies; a few hundred thousand oranges to New York and other Atlantic cities; while a few bales of sea-island cotton go to Savannah. The imports are dry goods and groceries for the supply of the people of the town and neighboring county; of which the dry goods are brought from New York, by way of Fernandina and Cedar Keys, and the groceries from New Orleans.

Tampa has been repeatedly visited by yellow fever, namely, in 1838, 1853, 1858, 1867, and 1871.

The epidemic of 1838 occurred during the Florida war, when Tampa was an important military post. The fever was brought in by the steamer Fashion from New Orleans, with military stores. It extended in the fort to 45 soldiers, the hospital matron, and three children, and of these 15 soldiers, the matron, and the three children died.

In 1853 the fever was also brought from New Orleans in a government vessel. Many cases occured among the troops, and from these it extended its ravages among the citizens. Altogether it is believed that the number of cases ran up into the neighborhood of 200.

In 1858 again the fever was brought from New Orleans by the steamer Magnolia. There was no garrison in the fort this year. The number of cases reached about 275, with about 30 deaths.

In 1867 the fever was brought from Havana on the Southern Star, cattle steamer, of which the history has been given in the section of this report relating to Manatee. The fever was carried into Tampa by Captain McKay, who left the steamer at Manatee, and traveled the rest of the way on a small boat. From him the disease spread through the town to the extent of 50 or 60 cases with 12 deaths.

In 1871 the fever was brought to Tampa by the steamer H. M. Cool, from Cedar Keys. The cabin-boy of the Cool sickened at Cedar Keys and was brought to Tampa, where he lived. He was nursed by Dr. J. P. Wall, who contracted the fever from him; Dr. Wall, in turn, was nursed by his wife, who was also attacked.

Since 1871 Tampa has remained free from yellow fever. It was quarantined in 1853, 1858, 1867 (?), and 1881. During 1872, 1873, and 1874 there was no quarantine. From

OFFICE OF CITY CIVIL ENGINEER, CITY HALL,
Charleston, S. C., August 23, 18

MY DEAR SIR: Your two postal cards and letter have just come to hand. very sorry indeed that the newspapers do not contain the matter which I expe them to have.* It is my fault. I gave the clerk at the News and Courier offic date of the articles, which were published the following day. Please send papers by mail. I shall exchange them for others of the date of publication. report of 1875 on "Present drains," you have a short description of subterra works built to answer the purpose of both drainage and sewerage. How imperf they serve their ends you can well judge from the accounts given you of their defective construction, size, form, and particularly from the want of any st plan of levels, fixing the elevation of ground with reference to mean low w proper selection of points of outfall, or inclination to insure the required veloc In many instances I have found these flat-bottomed works undulating, their in some places from 4 to 7 feet below mean low-water mark, Charleston Harbor. consequence was, they filled up then, as they do now, to the inside of the crow their arches with washings from street surfaces, and with all other objectionable ter contributed by yard drains and sewers, forming stench-traps composed of put and decomposed matter, which the influence of the heaviest rain does not carry while the gases emanating from them day after day during the summer months duce the malarial diseases to which warm climates are made subject by such cons tions. Very little was understood at that time in this country of sanitary works, of the many reasons that might be given why cities of slight elevation above th level should make a distinction between works of drainage and of sewerage. T works, therefore, were designed and built to answer both purposes and form, wh have as the old system of drains and sewers, which fed the worst types of fever the escape of the sewer gas through untrapped laterals into the atmosphere through their pervious walls into the soil. The only date I can find of their cons tion is given in an old record made by the "commissioners of streets and lamps," ering a period from the year 1806 to the year 1818, when a large number of these were constructed. From 1818 to 1856 other works of the same character were The dates of their construction are only to be found in the old newspapers on the Charleston Library, containing the proceedings of the city council, the orig proceedings and journals of the city having been destroyed by the burning o lumbia, S. C. The evil consequences of such works as described led to the adop of the plan of tidal drains, so called, but which were not fully carried out. T tidal drains, as I wish to show, supply the places of the old sewers that were destr in the streets where the tidal drains are now built. These receive the dischar the street surfaces and from all yard sewers, and also from the sewers in all streets, besides what is contributed by all yard sewers in the same. The comm who recommended their construction speak in their report of tidal gates, to be open at high and low tides, "to scour and flush out foul matter by the rushing in an of tide water with a given head and velocities due," &c. Moreover, I know from own observations that solid excrement is passed into them and flushed into the I therefore concluded, as evident from the facts stated, that they were origin intended, as now used to a great extent, as the means of drainage and sewerage.

It is evident from what has been shown that they were intended as subterra passages to receive the surface and subsoil drainage, to be the means of carryin the rainfall, and at the same time, by the tidal influence, to remove the sewage m contributed.

The plank foundations are built as you understood me to say, that is, planks laid longitudinally, then cross-planked. This correction please note on the diag Inclosed I send the map showing by shading the low places examined by us, contain the wells and privies so near to each other. The double red lines show location of the tidal drains, the single red lines the old drains or sewers, as far know. The areas colored blue show the contemplated sites for sea-water reser intended to replenish the leakage of the drains, the scouring out, and the supp extinguishing fires

With many excuses for taxing your patience with such a long explanation,

I remain, very truly, yours,

LOUIS J. BARBOT, C.

DR. A. N. BELL.

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* Statistics, &c., of the Artesian wells.

having the clothes, baggage, &c., disinfected, as may be required by the board of health; and for every violation of this section the party so offending shall be fined not exceeding $100 and punished by imprisonment for not more than twenty days.

SEC. 7. Nothing in these rules and regulations shall be construed to prevent vessels and boats engaged in the cattle trade with the Island of Cuba from taking on board cattle and other freight from the cattle wharf while in quarantine and delivering money and necessary papers pertaining to commercial transactions: *Provided*, That these transactions can be accomplished without any one from shore going aboard such vessel while at the wharf, or any one coming ashore during the same time, inasmuch as going aboard and coming on the wharf are a passing and repassing of the quarantine limit in violation of law and these regulations, and parties so doing shall be considered obnoxious to punishment for violation of the same by fine and imprisonment.

SEC. 8. All small boats are forbidden from going into quarantine limits to visit or take persons or freight aboard any vessel in quarantine without the consent of the board of health, and any person or persons so offending shall be required to perform quarantine for ten days and be subject to fine and imprisonment by the mayor.

SEC. 9. That all vessels entering this port shall be supplied with a copy of these quarantine rules and regulations. And any violations of the quarantine shall be punished in the manner prescribed by the act regulating quarantine, passed by the legislature, and approved March 11, 1879.

SEC. 10. That these rules and regulations shall continue in force until repealed; and all rules, regulations, or ordinances in conflict, or inconsistent with them, are hereby repealed.

SEC. 11. That the board of health hereby authorizes and directs its president to issue a proclamation establishing quarantine against all ports in the West Indies, Central America, South America, and Mexico, or all other parts where contagious or infectious diseases are known to be prevailing.

Approved May 30, 1879.

JOHN P. WALL,
Mayor and President Board of Health.

Attest:
JOSIAH FERRIS,
Town Clerk.

Proclamation.

Notice is hereby given in accordance with the law of Florida and the ordinance of the board of health of the town of Tampa, establishing quarantine rules for the port of Tampa, and I hereby proclaim and declare, that I am convinced that there is danger of contagious or infectious disease being brought into this place by either direct or indirect communication with the ports of the West Indies, Central America, South America, and Mexico, and I hereby forbid any communication, either direct or indirect, with the said ports of the countries above named, excepting under the conditions prescribed by the board of health of the town of Tampa for the port of Tampa.

Given under my hand and official seal at Tampa, Fla., this the 30th day of May, 1879.

JOHN P. WALL,
President Board of Health and Mayor.

Attest:
JOSIAH FERRIS,
Clerk.

CEDAR KEYS.

Cedar Keys is the Gulf terminus of the railroad running from Fernandina across the State of Florida. It was a small village of about twenty houses before the war, of which all but one were burned down soon after the war commenced. During the war the place was deserted, and was used as a burial-ground for a refugee camp which was located on the neighboring key of Atsena Otie, distant about two miles. In this way it is said that 1,200 dead bodies were buried beneath the soil upon which the present town is built; and it is also said that the remains of these dead bodies are sometimes disinterred in digging wells and the foundations of houses.

Soon after the war the place began to be again settled up. It was incorporated in 1869 with a population of about 200. The present population of Cedar Keys is 500 or 600. The adjacent key of Atsena Otie has a population of about 150 or 200. The key upon which it is built is of irregular surface, rising in some places to a height of 40 or 50 feet above the sea level, with an elevation in the business part of the town of 5 to 8 feet, and next to the sea a marginal belt of marshes from 100 feet to 100 yards in width, which are thickly overgrown with marsh grass, and which are overflowed daily by the inflowing tide.

under such circumstances as led to the belief that
of water from certain wells; and it was suspected th
tion of the water were the dead bodies already menti
ing the war on the spot where the town now stands,
what it is worth.

In 1868 the town suffered from a visitation of Asiati
Jacksonville by a negro woman who had a large fam
This woman lived on the Hill, and was surrounded
crowded, six to ten sleeping in a single room, among
The first case occurred on Friday—month and date no
Colonel Lutterloh—and on Sunday there were 22 death
at this time was about 150. All of the whites, except
on Monday. A good many negroes also left. Several of
City, at Gainesville, and at Waldo, but none of them
of those who died were negroes; indeed, only a few cas

In 1866 there were three cases of small-pox at Atsen
disease was brought from Savannah by Mrs. Aldridge
Keys.

In 1867–'68–'69 there were several cases of a fever of
have been determined, of one paroxysm lasting two or
deal of apprehension, but nobody died of it.

The first and only epidemic of yellow fever that ever
in 1871. At this time the population was about 350, hal
white refugees there were about 100; of black refugees a
leave in the town about 75 whites and 150 blacks; and
162 cases, about equally divided between the two colors.
1 mulatto, blacks none; a very moderate percentage of
out on the 20th of August, and the first death, that of Mr.
of the port, occurred about the first of September. The
as yellow fever until the 9th of September, which was Sun
the Saturday night preceding there were six deaths, among
Cormick. The excitement was intense, and everybody who
at once.

Rogers was reported to have been on the New Orleans and
Captain James McB. Baker, and to have opened the trunk of
which trunk was full of clothing that had been used by
Havana, and which had not been washed. This report wa
was also a report that a man had died of yellow fever on bo
days before Rogers was taken sick. The Lavacca ran betwe
bile. There was no yellow fever in Mobile in 1871, and this
was never verified.

Colonel McCormick's case was the first one that was identifi

Whereas this board of health is informed that contagious and infectious diseases prevail in the ports of the West India Islands, the Caribbean Sea, South America, Central America, and Mexico:

Be it ordained, That from and after this date any vessel arriving at the port of Cedar Keys from any of said ports shall perform quarantine for ten days from the date of her arrival at Cedar Keys if her crew and passengers are healthy.

That the port inspector shall visit all vessels arriving at Cedar Keys on and after the 20th day of May, 1879, in the performance of his duty under the quarantine laws.

Approved May 13, 1879.

J. IRA GORE, *Secretary.*

Meeting of board of health.

JULY 22, 1879.

At a special meeting of the board of health for the town of Cedar Keys, held July 22, 1879, the following resolution was passed:

"*Resolved*, That the board of health for the town of Cedar Keys approve the regulations of the National Board of Health, and will be pleased to co-operate with them in carrying out such rules as may be best calculated to protect the public health."

Attest:

J. IRA GORE,
Secretary Board.

TALLAHASSEE.

Tallahassee, the capital of Florida, a city of some 2,500 inhabitants, is 40 miles from the sea, and is connected with Saint Mark's, its natural sea-port, by the Saint Mark's and Tallahassee Railroad—one of the oldest railroads in the United States. Since the war the commerce of Tallahassee and of the adjacent country no longer seeks an outlet through the Gulf, but has been diverted from its old routes and finds its way now to Savannah and other Atlantic ports.

The sanitary condition of Tallahassee is similar to that of other Southern towns. The streets are broad, the dwelling-houses are built upon large lots, and there is abundant shade everywhere. The water supply is obtained from wells and cisterns. South of the town is a chain of ponds, which give rise to considerable quantities of malaria during the latter part of summer and the beginning of autumn, when the water is low. There are not many persons living in the immediate vicinity of the ponds, but the few who do suffer from intermittent and remittent fevers.

There has never been but one epidemic of yellow fever in Tallahassee. This occurred in 1841, and was brought from Port Leon. The first case was a painter who had been at work in Port Leon. It spread rapidly and was quite fatal. Number of cases not ascertained. Number of deaths between 60 and 80, but some of these are believed to have been due to congestive malarial fever. The population of Tallahassee at this time was about 800. Many refugees left the place in consequence of the epidemic, and several of them had the fever; but they did not communicate it in any instance to the people with whom they found asylum.

In 1853 two cases of yellow fever were brought to the hotel from Tampa. They were cattle drovers, and both recovered. The disease did not spread. In 1853 also yellow fever prevailed in Newport, eighteen miles distant from Tallahassee, and several cases were brought thence to Tallahassee and the adjacent country; but these cases also failed to disseminate the disease.

NEWPORT.

Newport was in 1853 a flourishing town of 300 or 400 inhabitants, but is now a little hamlet of not over a half dozen houses and about two dozen inhabitants. It is on the Saint Mark's River, eighteen miles from Tallahassee.

In 1853 it suffered from a visitation of yellow fever. It was brought from New Orleans by Mr. Ladd, who had been on a visit there and returned on a steamer. He had a room in his brother's store, and was taken sick soon after his arrival, lived five days, turned yellow and died, but had no black vomit. The second case was a druggist who helped to nurse Ladd. He recovered. The fever seemed to spread from this focus, and three or four of Ladd's clerks died. Whole number of cases about 150; deaths about 50. The fever commenced about the 10th of August.

PORT LEON.

Port Leon was situated 2 miles below Saint Mark's, and was for a few years a place of considerable business. In 1843 a September gale swept away the entire business part of the town, including the railroad buildings there, and the railroad track and

places, except for cooking. The houses of the better classes are surro
grounds in which the cocoanut, date-palm, tamarind, and many oth
ucts abound. Among the poorer classes, notably those of the Cuban
lations, the houses are small, crowded together, and densely pack
Garbage is required to be deposited once a week in boxes or barrels
removal by city carts. This is sold to parties who use it for the p
new land on the north face of the city. In regard to excreta, the pri
in its worst form, as no ordinance requires the emptying of these nuisa
too, excreta are simply deposited on the surface of the earth, expose
The air and well-water are both contaminated from this source a
garbage. Burials cannot occur without a permit from the city ph
mits are filed away, and a record of deaths has been compiled from
1876 inclusive by the keeper of the cemetery. This record gives the
ity, age, cause of death, and name of the attending physician. Par
illegible. I have tabulated the statistics for the year 1876, which w
a fair idea of the causes of mortality in the years free from epidemic
yellow fever prevailed as an epidemic, the number of deaths was 271,
about 40 were due to yellow fever. A reference to the table will show
tality due to phthisis and among the Cuban population. This is th
inhalation of dust in the manufacture of cigars. The diseases class
enteric fever are slow continued fevers, unaccompanied by lesion of
I think should be considered as "bastard typhoid fever" (see lect
Clerk, in Medical Record, April 20, 1878). The large mortality amo
to the employment of ignorant midwives, neglect, improper fee
unsanitary condition of houses and yards. As the record shows, Key
bly free from periodical fevers.

QUARANTINE SYSTEM AT KEY WEST.

By a law of the State of Florida, approved March 11, 1879, the ma
with the city physician, constitute the board of health, and are em
quarantine regulations. Copies of the law and regulations are for
report (page 101).

In this city the offices of city and port physician are filled by on
also holds other offices under the State. The election is annual, and
officer is just now the subject of a dispute between him and the
officer claims the fees (which are collected by himself, and amount t
annum), and the last resolution of the city council provides that the
the rate of $100 per month. The officer resides in the city, is allow
profession, and his official duties would not stand in the way of his
gious or infectious diseases in the city. The quarantine buoy which
ing station is one-fourth of a mile from the west face of the city. V
to come to anchor on the farther side of this buoy and signal for t

Statement of the commerce and trade of the port of Apalachicola, for the fiscal year ending June 30, 1879.

Amount of revenue collected at the port of Apalachicola, Fla., from July 1, 1878, to June 30, 1879	$745 80
Number of vessels entered during above period, 26; tonnage	6,031 94
Number of vessels cleared during above period, 31; tonnage	5,883 54
Number of vessels belonging to the district, 25; tonnage	1,447 33

A. J. MURAT,
Collector.

Detailed statement of vessels from foreign ports and New Orleans, La.

		Tons.
1878.		
July 31.	Norwegian bark Alma, from Delyle, Holland	457
Sept. 30.	French brig Helene, from New Orleans, La	185
Nov. 30.	Spanish bark Christena Pachico, from Havana	394
Dec. 14.	Norwegian bark Friso, from West Indies	469
1879.		
Feb. 1.	Swedish bark Indun, from Matanzas	607
April 1.	French brig Le Corenia, from San Juan del Norte	115
April 14.	Swedish bark Emob, from Saint Thomas	423
1878.		
Dec. 9.	American schooner R. A. Carter, from Colon, United States of Colombia.	349
Dec. 13.	American schooner Emma McIcham, from Porto Rico	167
Dec. 16.	American schooner Lizzie Hazen, from British Guiana	360
1879.		
Jan. 4.	American brig Endoris, from Saint Johns, Porto Rico	241
Jan. 17.	American schooner E. M. Buchler, from Colon	491
Jan. 18.	American schooner Mary A McCann, from Dominica B. W. I.	179
1878.		
July 20.	American schooner California, from New Orleans	17
July 24.	American steamer Wm. S. Holt, from Mobile	225
Sept. 5.	American schooner Martha, from Port Eads, Miss	73
Oct. 5.	American schooner Martha, from Port Eads, Miss	73
Oct. 5.	American steamer Mary Elizabeth, from New Orleans	97
1879.		
Jan. 13.	American schooner California, from New Orleans	17
Mar. 28.	American schooner California, from New Orleans	17
April 30.	American schooner Mary Theresa, from New Orleans	31
June 16.	American schooner Mary Theresa, from New Orleans	31

GENERAL OBSERVATIONS.

As will have been seen from the detailed statements of the foregoing report, the towns along the Gulf coast of Florida, between Key West and Pensacola, a distance in round terms of about 600 miles, are all of small size, so that the most populous number only a few hundred inhabitants, while none of them have any very extensive commercial intercourse with either foreign or domestic markets.

Their imports consist chiefly of dry-goods, furniture, hardware, &c., which are brought from New York and other Atlantic cities; and of provisions and other groceries, which are brought mainly from New Orleans. From the West Indies they get only a little wine, a little tobacco, a few cigars, and a little tropical fruit. Their exports consist almost exclusively of lumber, cattle, fish, sponges, and oranges. Very little lumber is shipped from any of the towns visited by me, the principal lumber ports being Pensacola, Mobile, Pascagoula, &c. There are mills at Tampa, at Cedar Keys, and at Apalachicola, but most of them turn out very little lumber, and, altogether, they do little more than supply the local demand.

The cattle trade is perhaps the most profitable business of South Florida. It can hardly be said to extend to the country north of Tampa, the principal cattle-ports being Tampa, Manatee, Charlotte Bay, and Punta Rassa. A few cargoes, indeed, have been carried from as far north as Saint Andrew's Bay, but the supply here is not abundant, and the distance is too great, so that the cattle reach the West India market in bad order, and many of them die on the way. This trade is almost monopolized by canes which prevail here at certain seasons small vessels are compelled to seel in some channel north of the city. Till the 1st of September it is believed th anchorage ground recommended would be safe for vessels of all classes. Infor of the approach of a gale can be had from the signal service at least one day bef arrival. Quarantine officials should have the discretion to allow vessels to se anchorage when danger was apprehended.

I recommend that a hulk (of large size such as would be safe in all kinds of w be securely moored at the point designated by the letters "B. S." on the accom ing chart to serve as boarding station and residence for the quarantine officer. hulk should be fitted up with accommodations for the sick to serve when dis different kinds prevailed at the quarantine. The selection of this site is based following considerations: It is adjacent to the point where all the various ch south, west, and northwest, converge. This reduces the deviations of vesse their courses to a minimum. The distance of this site from the city is somethin a mile, which is less than desirable, but no more distant spot can be selected c ent with safety to the shipping. The anchorage ground, marked on the chart i outline, should be southwest of the boarding station. The room and depth of are ample, and the location sufficiently removed from the regular channels.

2. *Quarters for passengers and sick.*

Near the west end of the island is Fort Taylor, a fortification inclosing ext buildings. These have not been occupied for a number of years, and do not likely to be. The fort is connected with the island by a wooden bridge easily gu It is suggested that this place is in every way suitable as quarters for the detent passengers not sick, and that the proper authority be applied to for permis make use of it. If this suggestion is not approved then a suitable building co erected on the northwest channel at some point between the hospital and war mentioned below. The estimate of cost is $5,000.

3. *Hospital accommodations.*

The most suitable place for a hospital is the point marked "screwpile" on the This is about 2 miles west of the city and in the right direction as regards th vailing winds which in summer are from the east-southeast. It is also suffic near the boarding station. This spot is bare at low water, but covered at all times. This condition is favorable to cleanliness and good health. A suitable st ure on which a hospital could be erected should consist of a platform 150 by 10 raised not less than 6 feet above high water mark on iron piles driven into the This structure should be substantial to stand the force of the gales and to save c renewal. The hospital and all necessary outbuildings, including a room for st ing and fumigation, should be made of strong frames, but slight and economical ing so that in the event of their being infected they might be destroyed and re at small cost.

Estimate for platform .... $
Estimate for buildings..

4. *Warehouse.*

A suitable place for warehouse and wharf for lighterage and storage of susp cargoes is designated on the chart by the letter "W." This point is on the west channel, about 1½ mile from the hospital site, in a direction north-northwe

Estimated cost .... $

5. *Medical staff.*

A medical officer who shall reside at the boarding station with two hospital ards, one to disinfect vessels and the other to perform the customary duties of ard at the hospital, would constitute the proper medical staff of the station. for the sick could be employed when needed.

6. *Boats and Apparatus.*

These could be furnished at a cost of $2,000, including a steam launch.

7. *Quarters for officers and men*

could be erected on the hospital platform and provided on the hulk at the boa station.

of the port by detaining the ship, the cargo, the crew, and the passengers in some safe anchorage, and interdicting communication with the shore until the advent of winter removes the danger.

(2.) The modification of this plan, so as to keep the ship and cargo in quarantine as before until cold weather, and allowing the removal, under proper precautions, of the passengers and the surplus members of the crew.

(3.) The temporary detention of the ship, the cargo, the crew, and the passengers, and their submission to such treatment in the way of disinfection as will serve to render them all innocuous and safe.

The conception embodied in the third of the plans just mentioned is that which controls the modern practice of quarantine. And since, as I have already stated, a quarantine station fitted for this sort of work would be very costly, and, as the tenor of this report goes to show, will be very much needed, since infected ships are of rare occurrence, it is plain that a single station of this sort must be made to serve the wants of a considerable number of ports.

I have given the matter some thought, and venture to suggest that a complete system of quarantine for the whole Gulf of Mexico might be arranged in this way, namely:

(1.) With an inspecting station at every port.

(2.) With three or four, or at most a half-dozen, hospital stations, say, one at New Orleans, one at Mobile, one at Pensacola, one at Cedar Keys, and one at Key West. I believe there are already quarantine hospitals at all these places.

(3.) With one single central station for the disinfection of ships and cargoes. This might be located at Ship Island, or at the Chandeleurs, or at Round Island, or in Mobile Bay. If there was any suitable place near the mouth of the Mississippi River that would be better, but I know of no such place.

It is easy to see how such a system of quarantine would work, although I have no time here and now to go into the details. If yellow fever was discovered on any vessel at one of the inspecitng stations the sick persons would be consigned to the nearest hospital station, while the vessel and cargo would be sent on to the central station for disinfection. I will only add that the number of hospital stations mentioned is rather too large than too small.

It may be urged that it would be a great hardship to send an infected vessel all the way, for example, from Key West to Ship Island for disinfection. But it is to be remembered that these extreme cases would be of very infrequent occurrence; and that an infected ship ought to be willing to do almost anything that would result, in a reasonable time, in the removal of her quarantine disabilities and her restoration to commerce.

YELLOW FEVER IN OPELIKA, ALA.

Opelika is a flourishing town of some ——— inhabitants, in Lee County, Alabama, on the ——— ———, and about 60 miles north of Montgomery. It is in a mountainous region, and has an elevation above the sea of more than 800 feet. The surface is uneven, and the surface drainage good. The soil is clay and loam mixed with sand. The subsoil is a porous sandstone, permeable to water. The water supply is obtained mostly from wells sunk into the sandstone above mentioned.

Here, as almost everywhere in southern villages and towns, we find broad streets, large yards, scattered dwellings, and abundant shade. There are a few privies with vaults, but the greater number are without any.

The town is not much subject to malarial influences, and is regarded by the people and doctors living there as extremely healthy. Of late years, however, there has occurred in the community a number of cases of typhoid fever; not in the shape of a widespread epidemic, but confined to certain families and small neighborhoods. (Query: Is it not probable that this typhoid fever is due to contamination of the water of the wells, which is evidently sipe water permeating the subsoil sandstone?)

Yellow fever was brought into Opelika under the following circumstances:

The Fitchett family, which had moved from Opelika to Memphis, lived in South Memphis, at 329 Hernando road, near Clay street, in the same neighborhood with Mulbrandon, Ray, and Hester, who were among the first to have yellow fever in Memphis this year (1879), and whose names are associated with the first focus of epidemic infection. The family consisted of Mr. Fitchett, Mrs. Fitchett, and two sons, George, aged twelve years, and Walter, aged eleven years. Mrs. Fitchett and the two boys left Memphis on Thursday, the 17th day of July, by way of the Memphis and Charleston Railroad. Five miles out they were stopped at a transfer station, and stood in a drizzling rain while their baggage was disinfected by sulphur fumigation, in accordance with the rules of the National Board of Health. Mrs. Fitchett and Walter were both taken sick *en route* on the afternoon of Friday, the 18th, and reached Opelika at 9.30 on the morning of Saturday, the 19th. They were at once removed to the house of Mrs. Bone, on the northeast corner of Jefferson and Clay streets, Mrs. Fitchett being Mrs. Bone's adopted daughter.

In explanation of this action it may be stated that the inhabitants of Key
acclimated to yellow fever, and the manifestations of it are confined to new
persons. The usual dread of the disease does not exist in this community. T
rence of an epidemic appears to be deprecated chiefly on the grounds of qu
against this place which it entails and injury to commerce with other po
United States.

The city authorities feel that the more important commercial relations of
are with Havana. An efficient quarantine would interfere with these and is
not desired. A form of quarantine is maintained, which owes its existence
the revenue which results from it. The loose manner in which it is condu
the community no uneasiness, and those subject to the tax are the sole comp

Such being the state of public opinion I am satisfied that no system of q
could be properly carried out by any officer under the control of the loca
health and subject to the influence of this community.

When we consider how exposed to infection Key West is from her proxim
frequent and almost unrestricted communication with the West Indies and
calculated she is, from her position and commerce, to become a focus for th
nation of the poison, the importance of efficient quarantine at this port can
overestimated.

Should Key West ever be connected with the main land by the railway no
templation, these considerations will receive additional weight.

Respectfully submitted.

W. H. ELLIO
Sanitary In

FERNANDINA, FLA., *August* 1

SIR: Inclosed you will find statement in regard to the action of the board
at Key West, which I beg may be attached to my report on that place.

Respectfully,

W. H. ELLIO
Sanitary In

Dr. T. J. TURNER, *Secretary.*

SUPPLEMENTARY REPORT ON KEY WEST.

In the report on Key West it was stated that the salary of the port and ci
cian was a subject of dispute between the incumbent, Dr. I. V. Harris, and t
of health. The board demanded that the fees collected by the port physici
be turned into the city treasury, in accordance with the provisions of sec
"Quarantine rules." Upon the refusal of Dr. Harris to comply, the board o
at a meeting held August 5, 1879, passed a resolution declaring the office vac

The board then proceeded to fill the vacancy by the election of Dr. Mason
hurst. This gentleman had held the office in 1878 and had proved most dil
sanitary matters. He failed to be re-elected in 1879 through political comb
I am satisfied that under his administration local sanitation will receive d
tion, and quarantine be made as efficient as defective rules and want of a
will allow.

W. H. ELLIOT
Sanitary In

AUGUST 13, 1879.

FERNANDINA, FLA., *August* 16

SIR: Inclosed is a report upon "the quarantine at this port and the actio
local board of health in relation to the rules and regulations of the National

I indorse the confidential communication of the Hon. Norman Browneon, n
correct, with the exception of the statements relative to the port physician
On these I have not been able to come to a conclusion. With regard to D
Pope, the present port physician, his election was due to political considera
am informed that in opposing the desire of the citizens for more stringent qu
regulations he was actuated more by mistaken views of his own interest th
regard for the welfare of the city and country. I beg that this communicat
may be considered confidential.

Respectfully,

W. H. ELLIOT
Sanitary Ins

Dr. T. J. TURNER, *Secretary.*

Island of Key West is of coral formation. What soil there is is composed of disintegrated coral limestone intermixed with a very small proportion of vegetable mold. There is no sand, and no clay, The soil is never more than a few feet in thickness; in many places it is only a few inches in thickness, while in many places still the solid limestone comes up to the surface. The highest elevation of the city above the mean level of the sea is 18 feet; nearer the wharves the elevations are much less, diminishing to a foot and a half, to one foot, and it is even said that the ground upon which stands the United States court-room has an elevation of only 6 inches. In high tides the sea invades the streets for a distance of three or four hundred yards. Within the limits of the city there are several depressed basins which in rainy seasons become flooded with water, and are thus converted into temporary ponds. Many houses are built in these flat places; and I have seen the water standing several inches deep for several days together under and around these houses. When the water dries up in such places they become very offensive to the sense of smell. Under these circumstances it would be natural to expect a considerable prevalence of malarial diseases; but I am assured by the physicians practicing here that malarial diseases are neither very common nor very severe. The explanation of this comparative exemption is perhaps to be found in two facts: (*a*) in the fact that the rainy season occurs at the end of summer and the beginning of autumn; and (*b*) in the fact that when the rains cease these ponds dry up very rapidly. With the exception of the flats here described the surface drainage is reasonably good; and everywhere the porous coral limestone absorbs rapidly the water falling in the shape of rain. Even in the flats it is only when the rain is abundant and after the rocks have been saturated that the ponds make their appearance. The climate of Key West is tropical, and frost never occurs in it at any season of the year. It is said that there are only five fireplaces in the whole city, and that fires are very rarely kindled in these. It is indeed only during the occasional northers that any discomfort is ever felt on account of cold. The climate is also extremely humid; and under the joint influence of the atmospheric moisture and the tropical heat many things mold and decay very rapidly. The vegetation is tropical, like the climate, and is widely different from everything else in the United States. The cocoanut palm grows everywhere; date palms also grow well and mature their fruit, but are not numerous; bananas, sapadillos, banyans, tamarinds, pawpaws, and sugar apples are common. The climate is well adapted to the cultivation of the orange, but on account of insufficient depth of soil they do not succeed well.

POPULATION AND COMMERCE.

The population of Key West, inside and outside of the corporation, is variously estimated at from 12,000 to 16,000. I place it at 14,000, which I am satisfied is rather above than below the truth Of these, in round numbers, about 7,000 are whites, of American and English descent; about 4,000 are Cubans, many of them of mixed blood; and about 3,000 are blacks and mulattoes. The whites are mostly from the Bahamas or are descendants of Bahama immigrants. Most of the blacks and mulattoes are also from the Bahamas. It is asserted by persons well acquainted with the place that it does not contain half a dozen families from the Southern States of the Union, and not over twenty families from the Northern States; and that in the whole population, exclusive of the garrison and the United States officials, there are not twenty-five unacclimated persons.

About one-half of the population are supported directly or indirectly by the trade in tobacco and the manufacture of cigars; the other half are dependent upon fishing and sponging. There are, of course, other occupations, and many smaller industries, such as merchants, clerks, carpenters, blacksmiths, teachers, ministers, doctors, and the like, but these are all subordinate to the two lines of business mentioned and dependent upon them.

The tobacco is brought from the West Indies, and most of it from Cuba. The cigars manufactured from it are shipped almost exclusively to New York, either directly by ocean steamers or through Cedar Keys and Fernandina.

About 30 smacks, of from 30 to 50 tons, are constantly engaged in the fish trade. These smacks average about one round trip a month the year round; on their return trips they bring West India fruits and vegetables, such as plantains, oranges, and alligator pears, which are consumed here in large quantities. There are also imported from Havana brandies, wines, and spices.

Many small boats and some schooners are engaged in the collection of sponges when the weather is favorable. These are shipped to New York.

Five steamers and six or seven schooners—the schooners being all owned here—are engaged in carrying cattle from the Florida mainland to Cuba, the principal shipping points for cattle being Tampa, Manatee, Charlotte's Harbor, Punta Rassa. For all these cattle vessels Key West is a kind of half-way house, where they get their clearance papers, obtain supplies, and find shelter in stormy weather.

There is a line of steamers running twice a week between Key West and Cedar

and regulation of quarantine, and I am satisfied that a quarantine properly equi
and administered strictly according to the national "rules and regulations" w
have their confidence and support.

W. H. ELLIOTT,
Sanitary Inspe

AUGUST 16, 1879.

RECOMMENDATIONS FOR PERMANENT QUARANTINE ESTABLISHMENT.

In examining the chart with a view to a proper location for a quarantine statio
is seen that Cumberland Sound serves as a common entrance to Saint Mary's and F
nandina Harbors. This sound is inclosed by the points of three islands, Amelia, Tig
and Cumberland; the two former being in Florida and the latter in Georgia.

The present boarding station on the north end of Amelia Island is conveniently
uated, but is open to the objection that isolation from Fernandina is impractical
The only available high ground on Tiger Island is dangerously near to Old To
The south end of Cumberland Island possesses all the essential requisites of a quar
tine station. It is isolated by nature, being separated from the rest of the island
an extensive marsh. Its sanitary condition is favorable. It is exposed to the
breezes in summer and its western shore is well sheltered from the northeast gales

The only drawbacks are, first, the vessels entering the harbor of Fernandina f
the ocean will have to diverge about one mile out of the direct course, and, second,
existence of shoal water for a considerable distance from the shore renders a l
wharf necessary.

This location is also the best site for the quarantine for Saint Mary's as well as F
nandina, and one establishment is sufficient to guard the commerce of both cit
The average number of foreign arrivals at both ports will not exceed one hundr
year, and domestic not over three hundred and fifty. To prevent conflict of pow
between municipal authorities and to avoid legal complications which may be ca
by the location of a quarantine in a different State from one of the ports it is desig
to serve, I suggest the propriety of making an effort to have the entire control of
establishment placed in the hands of the National Board of Health.

For the site of the station I recommend that the south end of Cumberland Isl
as far as the north shore of Beach Creek and a line drawn therefrom to the oc
beach be purchased. I have been informed that the land is for sale, and will as
tain positively and report.

The anchorage ground is inclosed in an oval line and marked A on the chart.
room is ample, sufficiently removed from the usual inland route of vessels, and saf
all kinds of weather. The long red line indicates the wharf, marked W. At the sh
end of this should be the medical residence marked R. North of this is the hosp
(H), which should contain accommodations for not less than 12 beds. To the so
east are the quarters (Q) for the well.

Vessels from ports most liable to infection so seldom bring cargoes, that I do
think a warehouse is required. Suspected cargoes could be lightered and the ve
detained.

Ballast should be dumped at the extreme south point of the island below low-w
mark, where the action of the waves is slowly wearing away the land.

The proximate estimate of cost of the establishment, including wharf, hospital q
ters, room for fumigation, boats, &c., is $5,000. This is exclusive of the amount w
may be necessary to purchase the land.

There is an impression prevailing here that the Government of the United St
owns five acres of land on the south point of Cumberland Island, where there
formerly a light-house. The ground on which the light-house stood has been wa
away, and its remains cannot now be seen at low tide.

SANITARY CONDITION OF FERNANDINA.

Fernandina, Fla., is situated on the land side of Amelia Island, in latitude 30
north and longitude 81° 27′ west. The topography is sufficiently shown in the acc
panying chart to render further description unnecessary. The corporate limits inc
Fernandina proper and old Fernandina, commonly known as "Old Town," the or
of which dates far back into the times of the Spanish possession. The populatio
estimated at 2,000 for Fernandina and 500 for Old Town, half white, half colored.

The climate is mild in winter, as shown by the semi-tropical character of the v
tation, and cool in summer from prevalence of the sea-breezes from southeast.

The site of the city is upon a sand plateau, which has a gentle slope to the so
west. Between Fernandina and Old Town is a salt marsh, a prolongation of wh
extends to the center of the city. All along the margin of this the ground r
abruptly, and then reaches its greatest elevation, about 30 feet above the level of

1858. About 40 cases, with about 12 deaths; first case, a man who was engaged in calking a vessel from Central America; came in July and left in August; population about 2,600.

1862. One case in December, a lady. This may be a mistake of diagnosis.

1863. Cases about 700, deaths about 300. One case in April, one case in July; became epidemic in August: population 8,000, including 3,000 soldiers; constant communication with Havana.

1864. About 1,000 cases, with 400 deaths; came in July and left in August; population 8,000, including 1,000 soldiers, and 1,000 sailors on men-of-war in the harbor; constant communication with Havana.

1866. A few cases, with six deaths, was brought by the telegraph-cable ship in July, and disappeared in August; population about 8,000, with a few negro troops.

1873. Two or three cases occurred on the hospital-ship Pawnee, supposed to have been contracted from the bark Yansberghaus from Havana, with sugar; did not invade the city; population, 1,500.

1875. About 300 cases, with 142 deaths; appeared in March and disappeared in August; supposed to have been brought by the Edna Harwood from Jamaica. This year a good many native children had the fever, but amongst these the mortality was small.

1878. About 40 cases, with 6 deaths; was brought either by the Dona Felisfora from Havana, or by the Maria Frederika from New Orleans. The two vessels lay together at Philbrick's wharf: first case was mate of the Maria Frederica; population, 14,000.

In 1873 Dr. Harris and Charles Burns were in Key West, and both of them visited the Yansberghaus. Afterwards each went in his own boat to Miami, just above Cape Florida, where they lived. They both had yellow fever after they got home, and from them it extended in a sparsely settled neighborhood to about 9 cases, all of which could be traced to direct intercourse with the first two cases.

The study of these brief epidemiological notes reveals several important facts.

1. That yellow fever in Key West has never prevailed extensively except when a large transient element has been intermingled with the regular population of the place. This transient element was furnished in 1863 by the United States Army, and in 1864 by the Army and Navy together, and in 1875 there had been a large influx of Cubans, driven from their own country by the revolution, and many other strangers had been in consequence drawn to the island.

2. That at least three-fourths of the epidemics that have occurred here the disease has died out in the month of August. This early decadence of the epidemic has been partly due to the rapid exhaustion of susceptible material, and partly also to the fact that during the month of August there is a usual prevalence of windy weather.

3. That there is sufficient proof that in the majority of the epidemics the disease was imported from Havana, and a reasonable presumption of importation in the remaining instances. Before I had visited Key West I was quite prepared to believe that, with the climatic and floral conditions so nearly akin to those of Havana, yellow fever, undoubtedly indigenous there, might also be indigenous here. But if this were so the disease should occur far more frequently than it has. Indeed, if it were either indigenous or naturalized here it would be reasonable to expect at least a few cases every year.

4. That, so far as can be ascertained, the introduction of the disease here has never been due to vessels engaged in the regular commerce of the place. It has never been traced to the fishing-smacks nor to the cattle-ships, and has never been connected with the introduction of tobacco or with the introduction of West India fruits.

5. I know of no instance in which the fever has been carried from Key West to any other place except in 1873, when it was carried from a ship in the harbor to Miami. Indeed, the intercourse of Key West with other ports of the United States is so slight and so infrequent, and is carried on under such conditions, that the danger is necessarily of small magnitude, as stated in a previous report made by me to the National Board of Health. I have been able to discover only one instance in which the disease has been brought into any of the Gulf ports of Florida by the class of vessels here mentioned; the instance, namely, when it was carried into Manatee and Tampa by the cattle-ship Southern Star.

THE IMPORTANCE OF KEY WEST AS A QUARANTINE STATION.

In the foregoing part of this report I have collected the data upon which our conclusions must be based as to the importance of Key West as a quarantine station, and as to the special regulations under which quarantine should be conducted here.

There are three relations under which these questions may be discussed:

1. The protection of Key West itself against the importation of yellow fever from other ports, and especially from Havana.

2. The protection of other ports of the United States, and especially the Gulf ports, against the importation of yellow fever from Key West.

any quarter. Besides, it would be impossible to enforce the detentic
ordered. The crews of these ships have their homes here; they have
boats; they swim like fish; they know every foot of the coast; public s
tains them; and it is certain that they would come ashore. The vessels n
in quarantine, but not the crews.

The situation of Key West is in many ways exceptional, is indeed uniq
blood in her veins is her commerce with Havana. Cripple this comme
and you destroy the place. With Havana and New York open to her, she
ent of all the rest of the world.

In view of the reasons here given, and remembering specially that th
crews of all these fishing-smacks and cattle-vessels are thoroughly accl
that the population of Key West is an acclimated population; and th
none of these vessels have ever proved vehicles of yellow fever, I would
that the rule of the National Board of Health as to the detention of
infected ports be so modified in its application to Key West as to requi
tion of only such vessels as come under one of the following heads, namel

1. Such as have yellow fever on board at the time of arrival, or one kn
had yellow fever on board during the round trip.
2. Such as are in an obviously filthy and unsanitary condition.
3. Such as bring passengers not residents of Key West.

The local quarantine regulations include provisions covering the first
three heads, but only that in relation to the first one has ever been enforce
during this exceptionally epidemic year, with virtually unrestricted inte
Havana, which is only eight or ten hours distant, Key West has remai
free from infection.

There is still another argument in favor of the limited quarantine that
gested, namely, this: That the people of Key West are not at all afra
fever, and will not agree to submit to regulations of a more stringent ch
I very much doubt whether protection ought to be forced upon an unwil
even if the danger were much greater than in this case it appears to be.
be no plausible defense of such a course, except that it was demanded by
of neighboring communities, and this defense is not applicable here,
West has never proved a source of danger to her neighbors.

Is it possible so to regulate the quarantine at Key West as to make it i
in the protection of the other ports of the Gulf against infection from K
do not see that anything could be done in this direction except to se
reports as to the true condition of things here, and true bills of health
small number of vessels that clear here for the ports in question.

Is it possible by any quarantine regulations enforced here to do anythin
of intercepting yellow fever in transit from the ports of the West Indies

The National Board is of course aware of the effort made by Sanitary Inspector Elliott to induce the authorities of Key West to adopt its quarantine regulations. They would not even give the proposition a respectful hearing. I do not know whether Dr. Elliott included in his report the full details of the action of the Key West board of health in reference to the proposition in question, so that I venture to quote from the minutes of the meeting of the 29th of July, 1879, the following resolution, which indicates the feeling that prevailed, in a very significant way: "It was moved and seconded that the report be amended by adding to the request the erection of warehouses, wharves, and railroad to Boca Chico, and the appointment of a chief medical officer." The motion was adopted. The intention of this motion was to throw ridicule on the whole proposition.

When your communication of the 9th of August was received by Mr. Knight, the clerk of the board of health, he issued a call for a meeting of that body, with the intention of laying it before them. But, the object of the call being known, the board refused to meet.

When the governor of the State received your communication begging him to use his influence to induce them to give to your recommendations a more favorable consideration, although he failed to make any reply to you, he did write an urgent letter to the Key West board. But no notice was taken of it.

Of course when I learned all these facts I had little reason to hope for the success of my own mission so far as the local authorities were concerned. As I have already explained to you, the new board was elected on the 10th of October, the vote was canvassed on the 16th, the new council held its first meeting on the 21st, and the new board of health held its first meeting on the 24th. This meeting was specially called to allow me to present the propositions of the National Board, which I did as clearly as I could. The propositions were discussed and laid over for further consideration at another meeting, which was held on the 26th. I was not present at this meeting, but was notified of the result in the following communication from the clerk:

HEALTH OFFICE,
Key West, October 27, 1879.

SIR: I have the honor to notify you that at a meeting of the honorable board of health of this city, held this date, the following resolution was passed:

"*Resolved*, That the board of health respectfully decline to accept the rules and regulations of the National Board of Health."

I have the honor to be, very respectfully,

WILLIAM RICHARDSON,
Clerk of Board of Health.

Dr. COCHRAN,
Member of the National Board of Health.

I begged that they would state the reasons upon which their declension was based, but they declined to do this in any official way. I begged also that they would state in what respect the regulations of the National Board could be modified so as to meet their views; but this they also declined to do.

I may be allowed to add, that while the people and the authorities of Key West manifested in every possible way their unfriendliness to the National Board of Health and its quarantine regulations, they treated me personally with very great consideration and respect.

PLANS AND ESTIMATES FOR QUARANTINE ESTABLISHMENT AT KEY WEST.

It is a difficult and responsible work to decide for any given place the proper location, character, and extent of the quarantine buildings demanded for it by a wise public policy.

The rules of the National Board of Health specify that "the quarantine station shall include—

"1st. A location for the boarding and detention of vessels.

"2d. Quarters for the detention of passengers not sick.

"3d. Hospital accommodation for the sick.

"4th. Lighters, wharves, and warehouses for receiving and storing cargo.

"5th. A chief medical officer, and such other officers or agents as may be necessary for securing the examination, cleansing, and disinfection of the vessel and its cargo, passengers, and crew.

"6th. Boats, apparatus, &c., necessary for administration.

"7th. Quarters for officers and men.

"8th. Burial ground."

It is evident at a glance that an establishment projected on the scale here indicated would cost a very large sum of money, and would be in excess of the reasonable wants of any but very, very large cities.

from storms and with a sufficient depth of water. This place is the littl
on the charts as Flemming's Key, but familiarly known as Mangrove Key.
always under water, only a very small part of it showing above the surf
even at low-tides, and covered with a perfect mat of scrubby mangrove
and on the adjacent banks there is depth of water, good anchorage, and
storms. There is no dry land for the buildings, so that they will ha
structed on piles. This will add materially to the cost of the station
very nearly double the cost of it, but the cardinal objection to the plac
too near the wharves of the city, being but little more than one mile dista
glance this objection would seem to be insuperable, and on account of
anxiously for some other available place, but none was to be found. The m
is exposed to the fury of the storms, and the banks there are not stationar
Key and Man's Key cannot be approached on account of the shallowness
Boca Grande is too far off and would be too inconvenient. And so with
locations that were suggested. They were either unapproachable or unsa
driven back again and again to Mangrove Key. It would be more satisfact
farther off, but after studying the question carefully I believe that its
the wharves would not be dangerons. I am assured that the winds do n
Mangrove Key towards Key West even as much as two days in a year, a
no other vehicle for the transfer of the infection that could not be eas
At any rate, there is no other available place except this key and the
neighborhood of which it is really a part. It is important to add that th
anchorage has always been in the vicinity of this key, and that even if a
tion were to be determined upon the vessel employed for that purpose wou
moored in this same neighborhood.

The next problem is to determine the character and extent of the quar
ings. It it evident from what I have already written that outside of the
inspection of vessels the real business of quarantine at this port will not u
very moderate dimensions. Perhaps on an average in four years out of fi
be for the hospital one or two, or at most two or three patients, while du
year the number might be increased to from half a dozen to a dozen.
proper care even of these few, two or three attendants will be neces
any accommodation at all is provided it must be sufficient for the excep
Acting on this presumption I have had drawn the plans that are herewit
and have also had detailed estimates prepared for the construction of the
buildings according to the plans. I have also had a rough chart draw
scale to show the location selected and its relations to the city front, and
and anchorages for the shipping. The inspection of these will show that i
to erect the buildings on a wharf at a distance of some 200 feet from the
of Mangrove Key. It is proposed that the front of the wharf shall be in

It is well to add here that the cost of material for building is high in Key West, and that all the estimates submitted are maximum estimates, and are based on the understanding that both the materials and the workmanship should be of the best possible character.

It is a question worthy of consideration whether it would not be in the end a true economy to substitute iron for wooden piles. After five or six years the wooden piles begin to decay, and from time to time would have to be replaced by new ones, while iron piles would last a very long time. I was not able in Key West to get an estimate for iron piles, but it will be easy to do so in Washington. If this hospital establishment were erected it might be made to serve as a lazaretto for cases of infectious diseases occurring in Key West, as well as for those occurring amongst the shipping. It would not be necessary to keep up a regular staff of physicians and nurses here, since these could be readily obtained in Key West whenever they were needed. It might be well, however, to keep some one always on duty so as to preserve the property. This could be done at small expense, say $20 or $30 a month.

BOARDING STATION.

I know very well that the boarding station of a quarantine establishment ought ordinarily to be at a distance from the city which the quarantine is intended to protect. But just as there is no place near Key West where solid ground can be had for a hospital station, so there is no place for a boarding station. There are three possible ways of solving the difficulty:

1. A boarding station might be constructed by driving piles and building a wharf for it on some of the adjacent banks in the same way as for the hospital.
2. A boarding station might be made of a schooner anchored at some convenient place.
3. A boarding station might be established within the city itself.

I decidedly recommend the last of these three plans as by far the cheapest and as quite safe during ordinary seasons. In seasons of special danger a floating station might be made use of as long as the special danger lasted. The boarding officer would need a boat. It would be quite possible for him to get along with a small row-boat and a single boatman. This is the outfit that the boarding officer here has heretofore made use of. A boat of this sort would cost, according to quality, from $50 to $75; a boatman could be had for $30 a month. It would of course be more comfortable and in better style for the boarding officer to have a larger boat; and if this were thought desirable a small sloop 18 or 20 feet long could be bought for from $200 to $300. This also could be managed by one boatman, and there would be no possible use for more than two. A boarding officer could be employed here who, for $150 a month, would discharge all the duties of the position and furnish his own boat and boat's crew. This would reduce the expenses of a quarantine here to less than $2,000 a year, plus the expenses of the hospital, which, as the hospital would be only occasionally needed, would not be large and cannot be easily estimated.

The need of warehouse accommodation for the cargoes of infected ships would arise here so infrequently—certainly not once a year on an average—that I cannot think it expedient to incur expense in this direction. If an emergency of this sort should present itself the cargo could be transferred to a lighter which could be temporarily chartered for the purpose. A similar arrangement could be made for the accommodation of passengers of infected vessels who were not themselves sick. Very few passengers come to Key West, and the need for accommodations of this sort would not occur perhaps once a year.

CONCLUSIONS.

I have discussed the question of quarantine at Key West with constant reference to the rules and regulations of the National Board of Health; and the fact that these rules and regulations are not at all adapted to the situation and circumstances of Key West has occasioned me no little embarrassment. I have, however, endeavored to present the various considerations bearing upon this question so fully and clearly as to enable the board to decide for itself what ought to be done. I feel quite sure, however, that with a competent officer in charge everything that is really necessary can be done in accordance with the plans that I have suggested above.

If this report proves to be at any point not so full or so precise as it ought to be, so that the board desires fuller information, I shall be able to furnish it, and will at any time take pleasure in doing so.

I inclose with this report two printed documents, namely:

1. An editorial from the Key of the Gulf, the leading newspaper of Key West, which will indicate the state of public sentiment here in relation to the National Board of Health.

2. A letter published this summer in the Newport News, and generally understa
to have been written here by a United States official on duty here.

If there is any truth in what I have myself written about Key West, then it is e
to see that the statements of this letter are, to express it mildly, very extravag
exaggerations. The people of Key West complain that they are constantly misrep
sented in this way, and that whenever a United States officer desires to get away fr
his post here for the summer he goes to work to create the impression that Key We
is such a pestilential place that it is as much as a man's life is worth to pass the su
mer in it. I give this for what it is worth.

If the National Board should desire to secure the services of one of the local phy
cians at Key West, I would suggest for favorable consideration the names of Dr. J.
Harris and Dr. M. J. Whitehurst, both of whom have filled the position there of hea
officer.

I send the chart and the plans for the buildings by express, as they cannot be c
veniently folded for the mail.

I have the honor to remain, very respectfully,

JEROME COCHRAN, M. D.,
National Sanitary Inspector.

DR. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

I desire to add a few words to what I have already said in relation to the establis
ment of a quarantine hospital at Key West. It is certain that such a hospital wo
always remain empty for the larger portion of every year, and that in a majority
years, and sometimes for several years together, there would be no patients to occu
it. This being granted, it becomes a question whether it is expedient to construc
hospital at this place at all.

The considerations that have influenced me to recommend the hospital are these

1st. It will be occasionally needed, and when it is needed at all it will be need
badly.

2d. It might also be made a lazaretto for the reception of patients from Key W
itself, as well as for patients from the shipping.

3d. Key West is now, and must continue to be, an important commercial port a
naval station.

4th. It is very near to Havana, is one of the gateways into our country, and is
miles distant from the nearest port provided with a quarantine hospital, namely, Ce
Keys, rather too far to send cases occurring at Key West.

Of course it would be quite possible to provide hospital accommodation by anchori
in the harbor, at a point very near to that that I have indicated for the location o
hospital building, of a dismantled ship. On account of the liability of ships to p
sistent infection, I have hesitated to recommend this plan. This is a point, howev
which the National Board can judge of for itself.

I learned at Nashville from Dr. Elliott that he had recommended a station at a po
some three miles from the wharves of the city. I discussed the claims of this pl
with several persons at Key West, particularly with Captain Cosgrove, whose kno
edge of the waters in that vicinity is unrivaled, and the conclusion reached was th
it would always be a dangerous place in storms.

Very truly,

J. C

STATE BOARD OF HEALTH,
Cedar Keys, July 21, 187

SIR: Yours of the 11th, requesting weekly reports, came into my hands here on y
terday, having been sent to Key West and then back to this place. You do not m
tion the character of the reports desired, but I suppose, naturally, that they
intended to cover the whole ground of the investigation. I will venture, however
this time, to give only a rapid preliminary statement, leaving the more detailed a
systematic report to be made from Pensacola when I have finished my survey. I wi
you from Key West, giving an account of the delays that occurred on my journey fr
Mobile to that place. Having reached Key West, I found it almost impossible to
away, the mail steamer remaining disabled until a few days ago. I succeeded at l
in getting off on the cattle steamer Ellie Knight, and reached Manatee after two da
travel on the 13th. Remaining two days in Manatee I hired an open boat, and a
traveling all of one night and part of two days reached Tampa on the 16th. Her
remained also two days, and left on the 18th on the steamer Cochran. I arrived
Cedar Keys on the 19th. Here I found a large number of letters, and for the f

time learned in a definite way of the outbreak of yellow fever in Memphis. The disabled mail steamer Ocean Gem, whose failure gave rise to many of these delays and annoyances, has been sent to New York, I suppose for repairs, and the Day Dream, now lying at the wharf preparing for her first trip, takes her place.

There was some advantage in going on the cattle ship from Key West, as it enabled me to learn something of the cattle trade, and of the details of their transportation. There was, at the same time, the disadvantage, if such it is to be esteemed, that it put me in a condition to be quarantined at Tampa. The detention which this would have made necessary I was fortunately able to avoid. Transportation along this whole Florida coast is extremely inconvenient and uncertain, and I see no way to get from this place to Saint Mark's, whither I go next, and in a few days, except the long and circuitous railroad route via Tallahassee, unless I attempt the journey of 100 miles in an open boat, as I did from Manatee to Tampa. There is a quarantine at Tampa, and another at Cedar Keys, quite sufficient for the present need of these two ports, although not at all of what quarantines ought to be. I will describe them and make such suggestions as seem to be advisable in my final report. In the mean time I send with this a copy of the quarantine regulations of Tampa, which are constructed on the ordinary model of our Gulf quarantines. There is no yellow fever or other infectious disease in any of the places that I have visited, nor so far as I was able to learn at any of the Gulf ports, neither do any of these ports seem now to be in any way specially threatened with danger of this sort.

I find here in the hands of the revenue officer, Mr. Curry, a copy of the first number of the Bulletin. I would be glad to have a few copies of this, or else of the pamphlet Regulations, which also I have seen only by accident.

I had already made some inquiries before I left Mobile into the Saint Andrew's Bay matter, of which Dr. Wight's report has been referred to me, and am able to state positively that, while two cargoes of cattle were loaded there for Cuba, nothing of the sort is likely to happen again during this summer at least. In a word, the whole east coast of Florida, from Key West to Pensacola, is now free from yellow fever, and bids fair to escape any visitation this summer. For reasons that I cannot now explain, I am of opinion that we will not have any imported yellow fever this season, and up to the Memphis outbreak, which is a new revelation in the habits of this disease, I had hoped that we would have this year escaped it altogether.

I may add that I have, as far as I have gone, collected the data to make my final report quite thorough, if not exhaustive, on all important points. Please address me up to the 25th at Apalachicola, and after that date at Pensacola.

Very respectfully,

JEROME COCHRAN.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

PORT OF PENSACOLA, FLA., *June* 18, 1879.

DEAR SIR: I have the honor to report that I have investigated the actual condition and wants of the port of Pensacola, as directed by the National Board of Health, and the following will convey such information to the Board as I have been able to obtain, with such suggestions as I have thought proper to make.

Quarantine at Pensacola is conducted by the board of health of the city of Pensacola, which consists of the mayor and aldermen and city physician. The board elects its own officers—a president, secretary, and executive committee. This executive committee is at present composed of Hon. George H. Oneal, president; Hon. S. C. Cobb mayor, and W. W. Carr, alderman. These gentlemen enjoy the confidence and esteem of the community, and the present quarantine is due in a great measure to their influence and labors.

The quarantine ground is guarded by a captain of the guard with four men, a detail from the navy-yard. This guard is stationed at the entrance of Santa Rosa Sound, on the United States monitor Canonicus, so situated as to command a great part of the bay in front of the city. This guard is required to be always on the lookout for the approach of incoming vessels, and to signal the boarding officer at the approach of any vessel. They perform the duty of quarantine police, and are instructed to permit no person to pass quarantine without proper papers.

The Canonicus, when the guard is stationed, is about 2½ miles distant from the present hospital site, where the boarding officer resides, and the only means of communication is by row-boats.

The hospital is situated on the mainland, on a government reservation known as Live Oak, about 9 miles from the city and 5 miles from the route of vessels coming from the sea.

making said improvements.

Sec. 4. And for the purpose of raising the ready means to pay for t
ments at the lowest cash prices, the said board is hereby authorized
scription list, and raise by subscription the necessary funds to pay fo
pledge the foregoing appropriated amount of taxes for the year 1878 f
of subscriptions, with interest.

Sec. 5. Subscriptions shall be received on a cash basis; but said co
ceive payment thereof either in cash, material, or labor, as they may
Voluntary contributions, either in cash, material, or labor, or trade,
ceived by said committee in excess of the loan.

Sec. 6. The board may appoint one of their members as treasurer
whom all such subscriptions for the contemplated relief fund shall be
so paid in, either in money or kind, the subscriber shall receive a c
following effect, viz:

"City of Fernandina,

"This is to certify that ——— ——— did subscribe and pay to the b
improvements of Fernandina the sum of —— dollars, to enable them
improvements contemplated in an ordinance approved January 15, 187
is secured and will be paid out of the revenue of the city for the year
or before the 1st day of February, 1879, with interest from date; or t
shall be received by the tax-collector in payment of cash levied for the
certificate shall be signed by the chairman and the treasurer of said
countersigned by the mayor, and the city seal attached thereto."

Sec. 7. The sanitary committee shall report to the city council on or
meeting in April next the amount of certificates issued under this ordi
with the amount of interest required to be raised for the same, and the
council will make and add such additional appropriation for the asse
for the year 1878 as may be necessary to provide for the payment of sai
for the purpose of meeting the payment of said certificates when du
further ordained that the amount so appropriated and set apart from t
be paid over to the treasurer of the sanitary improvement board by t
out of the money collected by him, and as fast as collected, when du
cates when redeemed shall be canceled by the treasurer of the board
ported to the city council.

Sec. 8. *Be it further ordained*, That the owners of city lots in and a
borhood of the contemplated improvements, whose lands are low and
the same either with open or covered ditches, connected with the near
or fill up the ground, as the board may direct; and it shall be the duty
committee, by its chairman or agent, to notify the owner or owners
drain them as designated; and upon refusal or neglect to comply with
in case of the absence of the owners of such lots, the said board shall
at the lowest cash price and charge the cost thereof to the owner of suc

The boarding will be done with a small boat, and all vessels from healthy Northern ports, which have no sickness on board, or any other reason for being sent into quarantine, will be permitted to proceed to the wharves of the city. Any other plan will be greatly detrimental to the interests and efficiency of the quarantine, as well as much more in conflict with the interests of commerce.

The summer being now so far advanced, and the hospital already established at Live Oak, and occupied by the sick, it will be better to carry it on at that place for the present season, making only such temporary improvements as may be absolutely necessary, and the estimates have been made with this purpose in view.

This is not, however, the proper place for a permanent hospital. It should be placed on Santa Rosa Island, at or near a site known as Clapp's Woods, about 2 miles from Fort Pickens.

Immediately after the erection of the new boarding station the quarantine anchorage will be established at Watch Harbor, a place in every way much better fitted for the purpose than that now used in the sound, and wholly out of the route of the shipping, and much more convenient, and more easily managed.

The stevedores will be moved from their present location on the mainland to the island, and the arrangement of the whole quarantine will be such as to promise protection to Pensacola, and Milton, and all the minor places on the bay. The proposed boarding station should be connected with the navy-yard by telegraph, where a wire already connects with Pensacola.

For your further information I append a pencil sketch of the waters and country about Pensacola and Milton, giving a view of the quarantine location and surroundings. I also append a sheet showing the "business" of the port, number of vessels, tonnage, men, import duties, &c., for one year, which is a fair example of any other year.

The recent ordinance of the city of Pensacola relating to quarantine is added for convenience of reference.

Your attention is called to the appended letter of Dr. Whiting as containing suggestions which may be of value in future, particularly that referring to a survey of Santa Rosa Island. In considering the items upon which this total estimate is based, I have made them apply to the total expenditure at quarantine. I have stated that the collections here will amount to about $2,800 during the whole year. Some portion of this local collection will of necessity be required for the expenses of the quarantine during the winter months, but I have had no means of arriving at the amount. What is not so used will be expended for the support of quarantine during the seven months for which the estimate is made and should be deducted from the total expenditure estimate. This amount may be safely considered at $1,500, which, being deducted from the $9,025, will leave $7,525 to be supplied by the National Board, less the $350 to be deducted in case Fort Pickens can be occupied as a boarding station.

Respectfully submitted.

Yours, very truly,

E. M. WIGHT,
Quarantine Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

PENSACOLA, FLA., *June* 19, 1879.

DEAR DOCTOR: I forward my report from this port to-day, and hope it will be found satisfactory.

I find it impossible to make a brief report cover anything on the subject of quarantine.

I took the liberty of telegraphing you this a. m. of my contemplated visit to Saint Andrew's. I shall not do much telegraphing as a rule, but I had no other way out of this case.

I incline to the belief that this Gulf coast of Florida will give us trouble this summer.

Yours, very respectfully,

E. M. WIGHT,
Inspector Quarantine.

Dr. T. J. TURNER,
Secretary National Board of Health.

and is not [illegible] from the
Lib[illegible] person or
[illegible]ever.

Report of the business of the port of Pensacola from July 1, 1876, to June 30, 187

ARRIVALS.

Classification.	Number of vessels.	Tons.
Foreign vessels	270	194, 801
American vessels from foreign ports	110	34, 560
Coastwise	210	49, 208
	590	278, 569

CLEARANCES.

Classification.	Number of vessels.	Tons.
Foreign vessels	278	200, 455
American vessels from foreign ports	84	26, 153
Coastwise	225	50, 116
	587	276, 724

Import duties	$7, 049 49	Exports, foreign	$1, 8
Tonnage dues	44, 116 11	Exports, coastwise	41
Hospital money	2, 342 94	Timber, cubic feet	9, 3
Hospital disbursements	5, 980 40	Lumber, square feet	67, 7

Comparative statement.—Shipping entered at following ports during year ending Ju 1876.

	United States.	Forei
Pensacola	106	3
Savannah	56	2
Mobile	72	7
Galveston	60	12
Key West*	295	7

* Including the many fishing smacks arriving from Havana.

PENSACOLA, FLA., *June 20, 1*

DEAR SIR: I left this port yesterday on the revenue cutter Seward for Andrew's. Last night when about 60 miles out we encountered an east wind, a which the vessel proved powerless to make headway, and we were forced to ret this port to-day.

There is now no means of reaching Saint Andrew's from here other than by a c smack, and they run but rarely. I am informed by the collector of customs that a contract has been made at that place for shipping one thousand cat Havana or other Cuban ports, and that the two vessels carrying these cattle a only ones reported as clearing from there this season, and he thinks the probab are that the last cargoes have already left, or are now being loaded.

The report of four vessels taking cargoes of "coal" from Saint Andrew's, appears in New Orleans Times of the 19th, should read "cattle" instead of coa "two" instead of four.

There is probably more danger of yellow fever being introduced at these ports along the Florida coast as the season advances, and they should be car watched.

I was so much disabled by the gale last night that I have not reported by tele for orders to proceed to-day, and I have a little further Pensacola work that I to do.

I am, yours, very respectfully,

E. M. WIGHT,
Inspector Quaranti

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

NEW ORLEANS, LA., *July* 4, 1879.

DEAR SIR: I have just returned from Barataria Bay, Fort Livingston, Grand Island, Chenierre Caminada, and the neighboring coast and passes, and have the honor to submit the following report:

Along this part of Gulf coast there is no place of commercial importance. The water is shallow for a mile or two out from the shore, and no vessels now land along this part of the coast. The inlets from the Gulf to Barataria Bay are Southwest Pass, Grand Pass, and Quartre Pass. The water in Barataria Bay is shallow, in many places not exceeding 3 feet in depth. It would therefore be impossible for vessels to navigate this bay. The only boats to be seen in it are a steamboat running from New Orleans to Grand Island, and a number of small sail boats laden with domestic fruits and fish.

The special point I wished to ascertain was if vessels from Havana, Hayti, or other infected ports, anchored off the coast to reship freight on small boats through Barataria Bay and the bayous connecting it with the Mississippi River. I made careful inquiry in regard to this point, and was informed by all with whom I conversed that such traffic was not carried on.

On Chenierre Caminada, an island 5 miles distant from Grand Island, I met Dr. J. J. Diet, a homeopathic physician, and a very intelligent Frenchman, who seems to be the most important individual in the country. He gave as his opinion that at present there is no danger of yellow fever being introduced along that part of the coast. In fact he stated that he would feel no apprehension unless the disease should reach New Orleans from some other direction, thereby meaning that their greatest exposure would be from New Orleans. Last year more than 300 cases of yellow fever occurred on Chenierre Caminada, and the disease was introduced by a man sick, arriving there from New Orleans. There were also between twenty and thirty cases on Grand island. The country on that part of the coast is inhabited principally by the lower classes of French extraction, who are for the most part ignorant fishermen.

There is no quarantine station on this part of the coast from the mouth of the Mississippi River to Wax-Bayou, on the Atchafalaya River.

While there is no danger at present of yellow fever being introduced from that part of the coast, still such a thing would be possible, in the event vessels should arrive and reship their cargoes on small boats as previously indicated. In that event a quarantine station could be established at or near Fort Livingston, where an unoccupied government building now stands that was at one time occupied by the officers of the garrison at the fort. Dr. Diet has promised to inform me should any danger arise, which would of course be promptly transmitted to you.

There is another matter of some interest connected with the sanitary condition of that country. Dr. Diet informed me that there are five or six cases of leprosy (*Elephantiasis*) on Chienierre Caminada, and a number of cases in either Lafourche or Vermillion Parish. As suggested by Dr. Bemiss of your board, I will, as I go along, investigate the diseases in those parishes, and report the result. In the morning I will leave for Morgan or Brashear City and the Atchafalaya country, and then direct to Galveston, returning by Sabine Lake, Lake Calcasieu, and Vermillion Bay.

Will endeavor to report to you from each locality as it is inspected.

Continue to send communications in care of Dr. S. M. Bemiss of this city.

Very truly, yours,

WIRT JOHNSTON,
Sanitary Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

ON BOARD SHIP ARANSAS,
July 6, 1879.

DEAR SIR: I have the honor to submit the following report of the sanitary condition of Morgan City (formerly Brashear City), La., and neighborhood.

Morgan City is situated on Atchafalaya River, 80 miles from New Orleans by rail, and 30 miles by water from the Gulf of Mexico, and has a population of about 3,000. It suffered severely from yellow fever last year, but is now in good sanitary condition. It is a point of importance, as the ships of the Morgan Line, plying to Galveston, Indianola, and Brazos Santiago, here connect with the railroad leading to New Orleans, and the ships of the same line carrying cattle from Indianola, Tex., to Havana, come here for provisions and to be overhauled, three every three months. One of these is now at the quarantine station, without sickness on board, having arrived on the 3d instant direct from Havana.

Many of the employés of the Morgan Line have homes at Morgan City.

Other vessels sometimes enter this port. The time from Havana is three days.

There is a quarantine station, or rather a station for the boarding and detention of

that it would also be well to erect a cheap building on the land for
the officer, which could also be used for the accommodation of passeng
could be used as quarters for the assistants, and as a hospital. To e
building would require about $1,000. A piece of land would also have
purchased. What the cost of this would be I cannot say; but Dr. Ca
ised to ascertain and inform me.

There is another point connected with the conduct of this quarant
would invite your attention. The ships of the Morgan Line, plying betw
and Galveston, Indianola, and Brazos Santiago, are permitted to enter
even inspected. I do not know that they usually have any communic
other vessels on their voyage in fact, I believe; they do not, but such
be possible; and it seems to me it would be well if they were inspected

I heard of no leprosy (*Elephantiasis*) in the vicinity of Morgan City.

I was not able to procure a copy of the rules governing the quarant
City, as the officer did not have a copy, but they are the same as those i
stations in Louisiana.

I am now on my way to Galveston, and will mail this from there, a
time to write it at Morgan City.

Have not yet received the rules of the National Board relating to qua
tinue to address me in care of Dr. S. M. Bemiss, New Orleans.

Very truly, yours,

WIRT JOH
Sanita

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

GALVESTON, TEX.,

DEAR SIR: In my report of Morgan City it would perhaps have been
mentioned, in connection with the statement that the ships of the Mo
ing to Galveston and Indianola are not inspected, that Mr. Hutchinso
the line, is a member of the Louisiana State board of health, and, it ma
that board some assurance that the vessels will not be permitted to com
vessels from infected ports. But it does seem to me they should be in
captains, without his knowledge, might have such communication.
remembered that the same company have ships running between
Havana, and it would be an easy matter, it strikes me, for the crews of
ning between Morgan City and Indianola to intermingle with those fro

Very respectfully, yours,

and in fact no accommodations for either sick or well. There is no special area of ground designated as quarantine grounds.

There is no record of the sick treated at quarantine during the last three years, but in 1878 and 1879 there were treated, one at the quarantine officer's house, and twelve on board vessels.

The following are the diseases that were treated: intermittent fever, 3; chronic dysentery, 1; acute dysentery, 1; remittent fever, 3; malarial fever, —; ophthalmia, 1. No death has occurred during the period mentioned.

The arrivals from all countries or ports south of the twenty-fifth degree of north latitude are subject to quarantine during quarantine season, whether the bill of health at the place of departure be clean or foul; arrivals *from every place* are subject to inspection.

All vessels coming from any place south of the twenty-fifth degree of north latitude are absolutely excluded from the port; they are permitted to return to sea, but are not admitted at all. These rules would probably be extended so as to apply to *any place* that should become infected.

The quarantine is against all contagious and infectious diseases. It was established on the 30th of April, and will continue until some time in the future not yet designated by the city board of health.

There is no difference made in favor of a vessel having a medical officer on board. When a disease which renders all arrivals from an infected or suspected place liable to quarantine has been officially certified to have ceased, and when clean bills of health are issued by the local authorities, the period that must elapse before free pratique is granted, the president of the board of health says, "would depend upon circumstances; the quarantine rules would, nothstanding, be continued until the end of the season."

No instances have occurred in recent years of the spreading of a disease from the quarantine station.

Cargoes are not removed from vessels, as there is no provision made for storing them.

When sickness occurs on board a vessel undergoing quarantine, and has no medical officer on board, the quarantine officer takes charge of the cases; but there is no provision made for compensating him. When a vessel is found filthy or badly ventilated, the ordinary methods are employed, except removing the cargo.

No record is kept of vessels put in quarantine, more than a note if filthy.

No certificate of inspection is given to the captain of a vessel leaving the quarantine station.

No record having been kept, cannot say whether any diseases for which quarantine is liable to be imposed in the port have occurred among the inhabitants of the place or neighborhood during the last ten or twenty years. The present board has been in existence for only three years, and there has been no yellow fever there during the time.

A few instances of evasion and infraction of the quarantine have occurred. The parties violating them, when coming by rail, have been arrested and ejected from the city; when coming by water, have been sent back and detained at the quarantine station for a period of twenty days, dating from the time of their arrival, and their clothing destroyed.

Land quarantine measures were adopted last year; guards were placed on the railroads, and all trains were inspected. Guards were also stationed on the bay, and no one from an infected place was permitted to enter until the expiration of twenty days from arrival. Those who were permitted to enter at once were required to have a certificate from a health officer, or some one authorized to administer oaths, to the effect that they had not been exposed to infection. Similar measures will be adopted this season, if deemed necessary. The measures adopted, so the president of the board of health thinks, demonstrated the efficiency of quarantine in preventing yellow fever.

The expenses of the quarantine are defrayed by the State. No fees are charged for any service in connection with the quarantine. The vessels pay for the material used in disinfection and fumigation, and there has been no objection made to this.

The aid of the National Government, through its military, naval, or revenue officers, has never been invoked in the enforcement of the quarantine regulations.

It is said that vessels have arrived here (as has been the case elsewhere) with a clean bill of health from a port where yellow fever was prevailing.

I inclose a copy of the governor's proclamation declaring quarantine in the State of Texas. I also inclose a copy of some resolutions of the Galveston board of health, which are the basis of the quarantine rules. You will observe that they are broad in their character. When any special question arises a meeting of the board is called to determine it. I forgot to mention that the quarantine is under the immediate control of that board. The quarantine officer says that it will require several days to make out the list of vessels that have arrived, as his records are scattered. When ready I will send it to you.

Many things are needed at this quarantine, but I will not specify them or give an

DEAR SIR: I have the honor to submit the following report of Calca and neighborhood:

On Calcasieu Pass, two miles from the little village of Leesburg (office) and a half a mile from the Gulf of Mexico, is a quarantine st established by the board of health of Cameron Parish, and is under the is located on shore, and consists of a small wooden house, owned by t officer, who is also the keeper of a private light-house, and is not a pl nearest inhabited dwelling is about a half a mile distant. There are n tions for either sick or well.

The quarantine is against all contagious or infectious diseases, and is against "all Mexican, Central and South American ports"; and if a with a clean bill of health, she is subject to the same detention (twen she had none.

Arrivals from any port where a contagious or infectious disease is pr be subject to quarantine.

No record has been kept of the vessels that have been put in quaran other arrivals; therefore I am unable to furnish it.

When a vessel arrives from a suspected port, or in a sickly condition, subject to quarantine, no inspection is made of her state as regards ventilation. No measures are employed to improve her sanitary con record is kept of any vessel.

When a vessel leaves the port, no strict examination is made of her if there is no sickness on board a certificate to that effect is given to the board of health.

There has been no violation of the quarantine rules; and should a ve quarantine pass the station without a permit, a fine of $250 would be she sent back to the quarantine station.

No disease, for which quarantine is liable to be imposed, has occurr inhabitants of the place. There was an epidemic of yellow fever at the Charles, which is 60 miles above the Pass, in 1867; but was introdu Orleans.

Quarantine measures by land were instituted last year throughout t country, and it escaped the yellow fever.

No fees are charged for any service in connection with the quarantin

The aid of the National Government has not been invoked.

The general sanitary condition of the country is now good.

Leesburg, the seat of government of the parish of Cameron, is a very and the country above it, on Calcasieu Lake side, is principally a ma sparsely settled. When Calcasieu River is reached the inhabitants numerous; and on Lake Charles, 60 miles above the Pass, is the town of the seat of government of Calcasieu Parish, and a point of some comm tance. A large quantity of lumber is shipped from this point. The rail Orleans to the interior of Texas, now being constructed, passes throu

Treasury. It is believed that the quarantine at Galveston and other points will drive a good many more schooners to this point.

I am of opinion that an efficient quarantine, with a physician in charge, should be established on Calcasieu Pass. In the event a vessel should arrive with sickness on board, and without a medical officer, it would be impossible to provide the sick with medical attention, as the nearest physician is 25 miles distant.

The expenses of the quarantine are now defrayed by the parish of Calcasieu paying one-half out of their public fund, and the citizens of Cameron Parish paying the other half by private subscriptions. They seem to do the best they can, but of course any quarantine would be inefficient without an intelligent power to govern it. The people seem to be anxious to have some assistance.

There is needed there a house for the quarantine officer and for the accommodation of passengers, a small hospital, and a small warehouse. The services of a competent physician are also needed as quarantine officer.

The approximate cost would be:

House for officer and passengers	$700
Furniture for same	250
Hospital	600
Warehouse	400
	1,950

The services of a competent physician as quarantine officer could probably be secured for $1,500 or $1,800. I know of one who would serve for the last-named amount.

One hundred and sixty acres of the land near the quarantine station is owned by the National Government, and the use of it might be procured without charge.

There remains but one point of any importance (Vermilion Bay) for me to inspect; and as the boat that runs there makes weekly trips, and does not leave Morgan City again until next Monday, I have concluded to run up home for a day or two, and return to Morgan City on Monday in time to take the boat.

Very respectfully, yours,

WIRT JOHNSTON,
Sanitary Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

LAKE CHARLES, LA., *July* 14, 1879.

DEAR SIR: I respectfully submit the following report of Sabine Pass, Texas, and vicinity:

The quarantine station is located on shore, on Sabine Pass, two miles from Sabine City, and six miles from the Gulf of Mexico. There is no house belonging to the quarantine station, but there is a small wooden house there belonging to the boatman and occupied by him. The nearest inhabited dwellings are 1¼ miles distant. There are no hospital accommodations. No special area of ground is designated as quarantine ground. There is no accommodation for sick or well. No death has occurred among the employés of the quarantine.

All arrivals from countries or ports south of the 25th degree of north latitude are subject to quarantine during quarantine season, whether the bill of health from the place of departure be clean or foul. The quarantine is against all infectious and contagious diseases.

Arrivals are subject to twenty days' detention, dating from the time of departure from the port; and vessels are fumigated and disinfected. Should there be sickness on board, they are detained twenty-five days after the recovery of the last case. No difference is made in favor of vessels having a medical officer on board.

When a disease which renders all arrivals from infected place has been officially certified to have ceased, and when clean bills of health are issued by the local authorities, twenty days must elapse before free pratique is granted to arrivals from the place.

No instance has occurred, in recent years, of the spreading of disease from persons or goods undergoing quarantine. In 1862, when it was supposed no quarantine existed, a vessel arrived from Havana, with yellow fever on board, buried several dead, and the crew came on shore at Sabine City. The result was quite a severe epidemic in that town.

Cargoes of every description are considered susceptible, and are fumigated with sulphurous acid gas, or chlorine gas, and disinfected with carbolic acid. This is done on board the vessel, as there is no warehouse in which to stow the cargo.

At this port quarantine goes into effect annually on the 1st of May,
the 1st of November. A copy of the regulations in force at the opening
is appended:

On the 23d of July the "rules and regulations" of the National Board

On the 8th of August the board of health passed the following:

"*Be it resolved by the board of health*, That pilots and boat crews brin
any kind into the port of Jacksonville shall remain on board until the v
by the port physician, and in no case shall they leave without the per
port physician, under a penaltv of twenty-five dollars."

And on the 11th of August, the following:

"*Be it resolved*, That from and after this date no vessel coming from th
Islands and tropical ports of South America shall be allowed to enter the
Saint John's River till further orders."

The adoption of the rules of the National Board left all existing quar
tions in force, except that portion of section 6 which declared any foreig
ports south of Florida "infected," without any regard to the existence or
of contagious or infectious diseases at those ports.

The action of the board, on the 11th of August, in effect re-enacts thi
cation of the term "infected" and establishes a non-intercourse quarant
the ports designated in the resolution. In taking this action the board
ceive that it was not in accordance with the rules of the National Boar
dent informs me that the board of health desires to co-operate with
Board, and that the above resolution will be repealed if it is requeste
the fact that the obstruction to commerce was expected to last only till
and that no accommodations were provided at the quarantine station, I
ing the request.

The quarantine establishment consists of two boarding stations, one
located at Jacksonville and the other at Mayport. The village of Mayp
on the south side of the mouth of the Saint John's River, about 25 mile
sonville. The estimated population is 150. To the eastward along the
a row of buildings known as "the cottages," which serve as a summer r
ors from the city. During the season, the occupants will number about
north bank of the river is Pilot Town, containing about 75 inhabitants.

The boarding station is just in front of the village of Mayport, and
designated by two yellow flags, one on each of the wharves, distant
apart. The channel at this point is rather narrow for large vessels to s
hospitals or accommodations of any kind are provided. The port physic
Weldon, occupies one of the residences in the village.

The channel over the bar of the Saint John's River is narrow, crooked, a
shifting. Vessels drawing 12 feet can enter at high tide in the daytim

ceed to the quarantine station on the other side of the bay, for inspection, or this officer should be a medical officer empowered to make the inspection.

The Mobile board of health is now engaged in an effort to cause the commissioners to adopt the quarantine regulations recommended by the National Board of Health. For the security of the port and the country contiguous to it, and the accommodation of commerce, it is clear that some new regulations should be adopted and better facilities afforded.

I made a careful inspection of various points for a quarantine station, which would be sufficient for the whole bay, but found none so well adapted to the purposes as the present station, which should be supplemented by the establishment of an auxiliary station at Grant's Pass.

I have thought it unnecessary to make any very extended report upon this port, until such time as the local authorities shall take such action as is now contemplated and in progress. After that is done, I think it would be well for the National Board to send an inspector here to report upon the "condition and wants" of the quarantine as it then exists.

Respectfully submitted.

Your obedient servant,

E. M. WIGHT,
Inspector Quarantine Stations.

Dr. THOMAS J. TURNER,
Secretary National Board of Health, Washington, D. C.

PORT OF MOBILE, ALA., *August* 5, 1879.

NATIONAL BOARD OF HEALTH,
Washington, D. C.:

In pursuance of my duties, I have made inspection of Mobile and herewith inclose my report. The sanitary condition is, in my opinion, something alarming. For over three weeks there has been rain every day, and that succeeded by a great deal of caloric. The system of water-closets is largely in favor of the sink or pit closet, and, I am informed by the chief of police, Captain Williamson, that it is only obligatory to have them attended to once during the year. You can imagine what condition they, very necessarily, must be in. In consequence of the porousness of the soil and the large amount of rainfall, the pits are nearly all of them up to the level of the ground. A great many of the people, too poor to pay for drinking water from the reservoir which supplies the more wealthy classes, are compelled to drink well water, and, as the wells are not generally more than 10 feet deep, and often times contiguous to the water-closets, you can well imagine the dangers to which they are exposed. During the dry seasons the sewers are never flooded because the water supply is so limited, and hence they are never washed out unless the rain comes and deluges them. In the pits are emptied the refuse matter from night vessels, and in many instances, the kitchen refuse is also poured into these places. Of course, last year, when there were over two hundred cases of yellow fever here, all the deposits and vomit were emptied into these festering pits; and now there is no doubt about it, things are very unsanitary here.

When I have approached the authorities on the subject, they have said that yellow fever will come whether you are clean or not. "How about the Rock of Gibraltar," they say, "what is unsanitary about that?" I tell them to wait and see. Memphis was not in a worse condition last year than Mobile to-day. I have seen no evidence of yellow fever here; but there is a great deal of malaria in the suburbs of the city.

The maritime quarantine will be in perfect working order as soon as the proper buildings are constructed; and they have already gone to work with your concurrence and aid. With reference to inland measures the system is very lax, on account of not having sufficient means for carrying on the work. They have no houses, of any kind, at their quarantine rendezvous; no means of fumigating goods or anything calculated to bring disease, and they are without means for employing a health officer. They have, nominally, quarantine against New Orleans, but I regard it as being defective. I made estimate for needs in this respect, which I forwarded to your honorable board last week.

I will make my report of Biloxi, Mississippi City, Pass Christian, and Pearl River, the latter part of the week. I will not go to New Orleans and the mouths of the Mississippi, unless the board especially desire it, as I would be quarantined at least fifteen days were I to go to New Orleans. I would be obliged to the board for instructions as soon as possible. My inspections are all made as far as I am able to go, and I would not be unnecessarily an expense to you. Inform me by letter if I shall return to my home.

Respectfully submitted by

J. D. PALMER, M. D.,
Inspector.

For NATIONAL BOARD OF HEALTH, *Washington, D. C.*

through the inland route, and the selection of this site will render unnece objectionable boarding station located in the city of Jacksonville. This si sufficiently remote from the centers of population, and ample space can be ha the well properly isolated from the sick. Clearing up the undergrowth woul the shade so agreeable in this climate, free ventilation, and freedom from mo The only objections are, that, being on the main land, isolation is more diffic on an island, and the encroachment of the river. With regard to the first of am inclined to think that a good fence and the general reputation of a lazare prove a sufficient protection. As to the encroachment by the river, even if it continue at its present rate, which is not probable, it is not fast enough to pr ous for many years to come. I therefore consider Saint John's Bluff by far t location for a quarantine station for Jacksonville, and recommend its adopt square with sides measuring 700 yards would contain 100 acres and afford s room. The municipal authorities have undertaken to make the necessary inq to cost. The marsh to the northeast has never been entered and can be taken ever holds title to the high ground. The quarantine station will require a w the lower point of the bluff, which is the proper place for the boarding station point is marked W on the chart which accompanies this report. If the comm this port should require a warehouse, it should be placed at the foot of the bl the wharf. The site for anchorage and detention of vessels is marked A, and mouth of Hannah Mills Creek, about three-fourths of a mile below the bluff. the nearest available point where sufficient room and depth can be had. It is all kinds of weather and sufficiently removed from the regular ship channel n a source of danger to passing vessels. The passage designated as the "Dark would be more isolated, but the depth is not sufficient.

On the bluff just at the angle of the ridge is a suitable site for the residenc medical officer, marked R. To the southeast on the ridge the hospital (H) sh located, and to the southwest the quarters for the well (Q). The hospital wil well away from the river, and the medical officer will be conveniently located the hospital and the quarters. The buildings should have strong frames to w the force of gales, and be covered with planed weather-boarding. Inside cei not necessary in this climate, and without them the danger of infection is les

A steam-launch should be provided for easy communication with vessel anchorage and to enable the medical officer to examine vessels in transitu w desirable. The importance of this has been already explained. Ordinarily ical officer with engineer for the launch, who could also take charge of the tion of vessels, would be sufficient for the work of this station, as it seldom oc infected vessels arrive at this port. Hospital stewards, nurses, and sanitar could be employed when needed. The approximate estimate of cost for this including land, fence, buildings, wharf, and steam-launch is $5,000.

In the recommendation for quarantine station at Fernandina no provision w for guarding the inland route from the south. Should yellow fever occur at a on the Saint John's River, Fernandina would be exposed through this route. yellow fever should occur at Fernandina then the quarantine station John's Bluff would be no protection to Mayport and Pilottown. In either con a quarantine station should be temporarily established on the inland route point between the Saint John's River and the city of Fernandina. The select suitable site is left for a future occasion.

Respectfully submitted.

W. H. ELLIOT
Sanitary Ins

JACKSONVILLE, *October* 18, 1879.

SAVANNAH, GA., *October* 25

SIR: By this mail I forward three packages; one containing chart of the h Saint Augustine, Fla.; another a pamphlet which is a "compilation of ordi and third my report on Saint Augustine. Many parts of the report in regar sanitary condition of the city I would have been glad to make more thorough, b as it is, it is the result of *one* day's inspection.

Respectfully,

W. H. ELLIOT
Sanitary Ins

Dr. T. J. TURNER, *Secretary*.

vessels from Havana come in occasionally; and only a month ago one entered and went away up Pearl River.

Sickness in my family forced me to ask for permission to visit them, and I am certainly deeply indebted to you for granting my request.

Respectfully,

J. D. PALMER,
Inspector.

GALVESTON, TEX., *July* 4, 1879.

DEAR SIR: In a conference with State Health Officer Rutherford yesterday, the following items of information were received from him, and are deemed of sufficient interest to communicate to your office:

1. Brazos Santiago is, under existing circumstances, the port through which contagious and infectious diseases are most liable to be introduced into Texas. The health officer showed me a telegram from Brownsville, indicating that there is antagonism between the county court of Cameron County and the quarantine officer (Dr. Main) appointed under State authority. The health officer was not able to give particulars.

2. The health officer of State has grave doubts of the efficiency of quarantine under the State law. Each locality is allowed to make its own regulations, and commercial rivalry or other local interest controls the authorities to a greater or less extent. The health officer was not able to furnish me with a copy of the quarantine law now in force in this State, for transmission to your office.

3. The State health officer expressed himself as heartily in favor of co-operating with the National Board of Health in matters of coast and inter-State quarantine. He is endeavoring to have the present State law so amended by the legislature, now in session, that the State health officer shall have more authority and quarantine regulations shall be more uniform.

4. The State health officer thinks there is danger of introduction of yellow fever by means of small craft into small coast towns not guarded by quarantine stations. He has endeavored to protect such points by appointment of health officers; but there being no appropriation sufficient to pay them he regards the quarantine as inefficient.

The facilities for reaching most of the points on the coast southwest of Galveston are very poor. A weekly steamer from New Orleans to Brazos Santiago touches at Galveston. There is steamer twice a week from Galveston to Indianola; but none from there to points beyond.

Under these circumstances, and on account of existing condition of affairs at Brazos Santiago, I have decided to go directly to that port, and from there visit other points on the coast between here and there.

I should be pleased to hear whether I can receive, while at Brownsville, the quarantine regulations mentioned in your communication of 18th ultimo. It would expedite the business of my tour if I could submit them to the local boards on my first visit to each place.

Will transmit to your office a copy of State quarantine law as soon as it can be obtained.

Very respectfully,

JNO. H. POPE,
Quarantine Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

GALVESTON, TEX., *July* 5, 1879.

DEAR SIR: I beg leave to hand you, herewith, copy of the quarantine laws now in force in the State of Texas.

Very respectfully,

JNO. H. POPE,
Quarantine Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

Quarantine laws now in force in the State of Texas.—(See Paschal's Digest, fourth edition vol. 2, p. 1526.)

ARTICLE 7339 (1). The governor is hereby authorized and empowered to issue his proclamation declaring quarantine on the coast of Texas, whenever, in his judgment,

established, and all fees and fines, as hereinbefore provided for, shall be used to defray the expenses of keeping said quarantine.

ART. 7346 (5). Section eight of the aforesaid act (shall) be so amended as to read as follows, to wit:

It shall be the duty of the town or city authorities aforesaid, as soon as the quarantine ceases to exist, to make a succinct statement of receipts and expenditures, and forward the same to the comptroller of the State; and should the expenditures amount to a greater sum than the receipts, they shall draw from the treasury of the State, upon an order from the comptroller, the excess of such expenditures over the receipts, as in other cases made and provided. And, should the receipts exceed the expenditures, the aforesaid town or city authorities are hereby authorized and empowered to appropriate and use such excess for the maintenance of marine hospitals in their respective towns or cities: *Provided*, That nothing herein contained shall prevent any town or city in the State from establishing any quarantine which they may think necessary for the preservation of the health of said town or city, not inapplicable to the provisions of this act.

ART. 7347 (6). All acts and parts of acts in conflict with this act are hereby repealed.

ART. 7348 (9). An appropriation of ten thousand dollars is hereby made out of any funds or money in the treasury, not otherwise appropriated, to defray the expenses accruing under this act.

ART. 7349. (10). All acts and parts of acts in conflict with this act are hereby repealed.

AN ACT authorizing counties, cities, or incorporated towns to establish quarantine ordinances, rules or regulations. (See General Laws of Texas, 1874, p. 228.)

SECTION 1. *Be it enacted by the Legislature of the State of Texas*, That the board of aldermen or the county court of any county, city, or incorporated town on the Gulf coast of Texas be, and is hereby, authorized to pass or establish rules or regulations in regard to quarantine, restraining vessels and persons, not in conflict with the laws of this State and the United States.

SEC. 2. That this act shall take effect and be in force from and after its passage.

Approved May 4, 1874.

STATE QUARANTINE LAW.

[Senate bill No. 312.]

AN ACT to amend and supplement the existing quarantine law of the State of Texas, title eighty three of the revised statutes.

SECTION 1. *Be it enacted by the Legislature of the State of Texas*, That title eighty-three of the revised statutes shall be amended and supplemented so as to hereafter read as follows:

ART. 4090. The governor is empowered to issue his proclamation declaring quarantine on the coast or in any part of Texas whenever in his judgment it shall be necessary, and for such length of time as he may decide to be essential to prevent the introduction of any infectious or contagious disease: *Provided*, Houston, in Harris County, shall be considered a coast town within the meaning of this act.

ART. 4090 (*a*). It shall be the duty of the governor of the State of Texas, and he is hereby authorized and empowered, to select and appoint, by and with the advice and consent of the senate, from the most skillful regular physicians of the State of Texas, one physician who shall be known as the medical health officer of the State; that he shall from previous and active practice be familiar with yellow fever, and thereby be as competent as possible of discriminating between it and other diseases, and pledged to the importance of both quarantine and sanitation.

ART. 4090 (*b*). That he shall be of sufficient age to have acquired mature judgment, and not so old as to be inactive and incapable of active duty, and that he shall be entirely under the direction and control of the governor.

ART. 4090 (*c*). That such health and quarantine officer shall during the time he is actively engaged in public duty receive for his services ten dollars per day and all necessary traveling expenses, a bill of which must be made out in detail and sworn to, and then approved by the governor, on which approved account the comptroller shall issue his warrant on the treasurer for the amount of such accounts.

ART. 4090 (*d*). That when the governor is informed or has any reason to believe that the State of Texas is threatened at any point or points with the introduction of yellow fever, cholera, or plague, he shall immediately order such quarantine officer to the point or points threatened, with instructions to carefully examine into such information or alarm, and if satisfied that the report or information is true, and that there is danger to the State, at such place or places, of any of said diseases being introduced, the governor shall immediately declare quarantine at such place or places against the

limits are calculated to injure the drinking water and pollute the air. A site
new cemetery should be selected. As the land to the north is low, a better site
be found among the sand hills to the west of the San Sebastian River, a locality
ciently removed to have no injurious effect upon the sanitary condition of the
Burial permits are not required, no records kept, nor could any statistics of mortali
obtained.

QUARANTINE.

The ordinances regulating quarantine will be found on page 10 of the compil
and were passed April 16, 1877. During the summer of 1879 the board of health
ted the rules and regulations of the National Board. No part of the ordinances
conflict with the rules and regulations, consequently they are not repealed by th
tion of the board.

The quarantine station is on the west side of North Beach, near the mouth of
Creek. The spot is a desert waste of sand hills without vegetation except a
growth of weeds. The system pursued was simply to detain suspected vessels
longer or shorter time till fears of infection had opportunity to subside. Occasio
infected vessels have been forbidden to enter the harbor at all.

Up to the time of the adoption of the rules of the National Board, Dr. William
the city physician, was also quarantine officer. Recognizing the impropriety of
ing both offices he resigned the position of quarantine officer, and Dr. Louis A. P
was elected to fill the vacancy.

The commerce of Saint Augustine is limited to supplying the wants of the
itself. The Saint John's River is a broad highway which serves to carry on the
merce of that portion of the interior of Florida which would otherwise flow th
Saint Augustine. The number of arrivals at this port during the year 1878 w
and for the first nine months of 1879 was 23. Of this number 10 per cent. were
West Indian ports. All the rest were from the Atlantic coast, north of Saint A
tine. It rarely happens that an infected ship arrives at this port.

RECOMMENDATIONS FOR A PERMANENT QUARANTINE ESTABLISHMENT.

The site now used as a boarding station, on the west side of the North Beach,
best for the location of a quarantine station. The locality has all of the ess
requisites for the purpose. It is sufficiently removed from the city, and being
habited, is completely isolated.

The anchorage-ground is safe in all kinds of weather, out of the track of p
vessels, and has ample room. The sanitary condition of the place is excellent.

I recommend that a residence for the medical officer be erected at the point m
T in the chart. In front of the residence should be a wharf, to serve as boardin
tion. A little to the north is a suitable location for a hospital, marked U.
southeast, near the extremity of the beach, is the site recommended for the qu
for the well, marked V.

As the channel is close in shore only a short wharf is required. The bui
should be constructed with strong frames, as the place is exposed to the full f
the gales. Cisterns should be provided for drinking-water, as the well-water
sea islands is brackish and unwholesome. The buildings should be provided
piazzas on all sides, as there are no trees to moderate the excessive glare fro
white sand. An approximate estimate for the cost is $1,500.

Respectfully submitted.

W. H. ELLIOTT,
Sanitary Inspe

SAVANNAH, GA., *October* 24, 1879.

REPORT ON SAINT MARY'S, GA.

The town is in latitude 30° 42′ north, longitude 81° 33′ west, on the north ba
the Saint Mary's River, and about 10 miles from its mouth. The river form
boundary between Georgia and Florida; the island of Amelia, with the city of
nandina, lies to the southeast. To the east lies Cumberland Island, and the
of the same name is between the two islands. All these points may be seen from
Mary's, as only marshes intervene.

The population is about 800, nearly equally divided between white and col
The climate is about the same as that of Fernandina. The open marshes offer n
struction to the sea breezes, and the water in front of the town is salt, except
there is a freshet in the river. The town is built on a plateau of pure sand
average elevation of 10 feet above mean low water. This plateau is in the form

peninsula, flanked on either side by marshes subject to the overflow of the tides. The stratum of sand has an average depth of 10 feet, and beneath it is a layer of hard dark-brown material, which seems to be sandstone in a state of formation. To the northwest, and just beyond the limits of the town, is a low tract of several acres, known as the "Bay Swamp." This drains a considerable portion of the adjacent land, but contains water only in rainy seasons. It is drained by a large open ditch, which runs along the western border of the town to the river. The tide flows in and out of this ditch, so that it serves as a drain only half of the time. The water supply is exclusively from wells and pumps. Most of them penetrate only to the hard stratum, and must contain some swamp water; a few go into the brown material, and the water from these has a slight taste of sulphur. As most of the people are supplied from the street pumps, and as the streets and lots are spacious, the drinking water and the privies are farther apart than is generally the case where the two are found together. The drainage is effected by two open ditches; the soil is so porous that water quickly sinks from the surface, and the town is said to be exempt from periodic fevers. The streets are wide, generally overgrown with grass and weeds excepting a wagon-track in the center and a foot-path on each side; one side-walk is paved with wood and a few others with oyster-shells. The streets are kept clean and in excellent condition, but for the weeds; they are shaded by a magnificient growth of live-oak, cedar, and pecan trees. On the city front are six wharves, built of hewn pine logs, the spaces filled in with stones and earth. Two of them are in use and in good condition; the wood-work of the others is much decayed, and they are used to some extent as places of deposit for the refuse from the neighboring houses. At the west end of the waterfront is a large pile of decomposing pine sawdust, and in front of this a decaying wharf, which retains much of the filth floated to it by the river. There, is, however, no evidence of disease caused by these things among the neighboring people. The houses are all of wood, mostly surrounded by spacious and shaded grounds. The privy system is in use, but there are no vaults; there is no ordinance compelling the cleaning of privies or removal of garbage. The cemetery lies to the west of the town in a beautiful forest; it has no keeper, and the burials are made without *permits*. No records of burials are kept, and there are no statistics of mortality. It is stated that there was but one interment during the quarter ending September 30, though the cemetery is used by the country people as well as by those of the town.

The board of health is created by the following ordinance of the city council, which can abolish the board, but cannot control its action. No provision is made for city sanitary expenses.

"AN ORDINANCE creating a board of health for the city of Saint Mary's, Ga.

"*Be it ordained*, That the health officer, health committee, and such other persons as they shall select, shall constitute a board of health for the city of Saint Mary's, who shall have power to make such rules and regulations as they think necessary for the preservation of the health of the city.

"*Be it further ordained*, That the health officer and health committee shall have power to elect three or more persons to act with them on the board of health.

"*Be it further ordained*, That the health officer is hereby declared to be president of the board of health.

"Passed in council July 21, 1879.

"J. M. ARNOW, *Mayor*.

"I. I. VOCELLI,
"*Clerk of Council*."

The quarantine establishment consists of two stations, and a medical officer, who is elected annually by the city council. The present incumbent is Dr. F. Barnard, who resides in the town, and is *ex officio* president of the board of health. The stations are only certain anchorage grounds, where vessels may lie in quarantine. The lower one is in Cumberland Sound, the upper one in the Saint Mary's River; no quarantine buildings are provided. The rules and regulations of the National Board of Health were adopted August 9, and have been enforced, at least as far as disinfection of ships is concerned. The commerce of the town is small, the average number of arrivals from foreign ports not exceeding one per month; the arrival of an infected vessel is a comparatively rare occurrence.

RECOMMENDATIONS FOR A PERMANENT QUARANTINE ESTABLISHMENT FOR SAINT MARY'S, GA., AND FERNANDINA, FLA.

In regard to the above subject, it is stated in the report on Fernandina, that the south end of Cumberland Island, designated as "Latam Hammock" in the plat of Dungeness Plantation was the most convenient locality for the establishment of a quarantine which would serve for the commerce of both cities. (See plat of Dun-

BROWNSVILLE, TEXAS, *July* 23, 18

SIR: I have the honor to report information on the following subjects:

1. Topography of the harbor of Brazos Santiago, of Brazos Island, Padre Isla Clark's Island, and Point Isabel, on the mainland (with sketch illustrating).
2. The sanitary history, present condition, and necessities of Point Isabel tracing of map of the town).
3. Relative importance, recent history, and present condition of quarantine at zos Santiago; investigated under rules, schedule T., circular No. 2, National Boar Health.
4. Defects in the quarantine at Brazos Santiago.
5. Immediate necessities in order to enforce proper quarantine.
6. Permanent quarantine station, with suggestions as to its site.
7. Proximate estimate of cost. What the State of Texas has done.
8. Mouth of the Rio Grande. (Sketch map of Rio Grande from Brownsville mouth.)
9. Clarksville (and Bagdad, Mexico).
10. Importance of Bagdad as a quarantine station.
11. History and present condition of quarantine at the mouth of the Rio Grand
12. Strong and weak points of the present quarantine at the mouth of the Grande.
13. Suggestions as to proper remedy for remote (permanent) application.

I have sought information from all intelligent physicians, custom-house offici county and city officials, intelligent citizens, especially old residents, surveyors, pil and boatmen, officers of the United States Army and Navy, members of the Sig Service, Mexican officials, to wit, medical officer, commanding general, and gove of Tamaulipas; American consul and vice-consul at Matamoras, intelligent citi of Matamoras, native and foreign, and by actual inspection of all the points tre of, especially the sanitary condition of any place. Soundings of the harbor of Bra Santiago were made under personal observation, and are practically correct as fa concerns quarantine.

1. Brazos Santiago is on the northern point of Brazos Island. It is not more th 5 feet above tide-water. There are three small houses occupied by a pilot and family and two other boatmen, about ten souls in all. There are wharf and wa house, with a shed-room for telegraph office. Sea-going vessels land at this wharf, passengers and cargo are taken by smaller vessels to Point Isabel on the mainla The waters of Gulf and Laguna sweep over the island (at this point) during stor The sand hills running along the center of the island are more or less changed by ev severe storm.

Padre Island has its southern extremity just across the ship-channel from the nor ern point of Brazos. It is a narrow, low, sandy island, extending to Corpus Chr Pass, parallel with the mainland, from which it is separated by the Laguna Mad It has a range of sand hills along its center which, I am informed, shift more or with every severe storm. One of the light-houses is on the harbor shore of this isla and it was deemed necessary to use iron screw piles to strengthen the foundat against storms. The light-keeper and his wife live in this light-house. No ot houses for fifteen miles up the island. The highest point (sand hill) on this port of the island is about 8 feet above the sea.

Clark's Island is on the western side of Brazos, from which it is separated by wa in high tide only. The west end is some 12 feet above the sea, and has a level port of about two square miles. It is covered with grass and has some cactus and mesq bushes growing on it. It is about 400 yards from the level of the grass (high grou to a channel of three feet depth. Small skiffs can approach to within 100 feet of land.

Point Isabel is on the mainland about one and a half statute miles from the end of Clark's Island. Soundings were not made between Clark's Island and nearest point on the mainland on account of approaching darkness. My belie that the sketch shows this water too shallow. I am reliably informed that there channel of 2¼ to 3 feet extending around the west end of the channel to its so side.

Point Isabel is the Gulf terminus of the Rio Grande Railroad, which extends to Brov ville. It is situated in north latitude 26° 0.4′ 38″, longitude 97° 11′ 37″. The road depot is 7 feet and the light-house 30 feet above mean tide. Point Isabel small village, though laid out for a town. The accompanying map shows its str as regular, but there are, in fact, but one or two streets. The main street is Rail avenue, down which the railroad runs. On each side of this, and about 50 feet f it, are dwellings and stores. The hill on which the light-house is situated has ha dozen houses on it. The streets have not all been cleared off since the village located here seven years ago. Mesquite bushes and cactus still grow in most of streets unmolested. There are about 100 dwellings or habitations in the village; hotels and one or two boarding houses, and six stores. Two small stalls for suppl meat to the inhabitants hardly deserve the name of markets. The permanent population numbers about 300. There is also a transient population of about 100 (average) who come here for the benefit of the sea bathing. About 80 per cent. of the permanent population consists of a low class of Mexican fishermen, boatmen, and railroad laborers. About 20 per cent. of the people are of a well-to-do class, railroad officials, government employés, and storekeepers. The surface of the ground is more or less undulating and seems to have sufficient fall for drainage, principally to the marsh west of the town, by means of a considerable depression (not a ravine) at the foot of the light-house hill on its south side, and running parallel with the range of hills from the bay to the marsh. The soil is dark sandy loam, and is said to dry very rapidly after a hard rain.

2. The first death among the inhabitants occurred four years ago, when it had about the same population as now. Twenty-four deaths have occurred since. More than half the mortality was amongst children under ten years old; two of them died of croup, one of trismus nascentium, one of poisoning. Three of the adults died of consumption; one from child-bed fever. This is as far as reliable data could be obtained, as there is no physician here. There has been no epidemic at the present village, which is three-fourths of a mile below Old Point Isabel. Yellow fever visited Old Point Isabel in 1858 and in 1867; both times it was imported. Cholera also visited the place in 1866. (?) The diseases said to be most prevalent at New Point Isabel are intermittent remittent fevers.

Garbage and refuse of all kinds are thrown into the streets and yards and left there. About 20 per cent. of the people use privies. The remainder use large, shallow, open pits, dug two or three feet into the ground, or go to the Mesquite thickets. No disagreeable odor was found about the village, which is believed to be due to the continued drought and the very fresh Gulf breeze blowing constantly, except for about two hours after daylight. Some of the citizens use water from a well on Railroad avenue. Most of them have it furnished from a well about a mile up the railroad, while a few use water brought by the railroad in a tank, from the Resaca de la Palma. The well water is hard and slightly "brackish."

There should be garbage carts to haul off the refuse daily. Citizens should be required to keep their premises clean. Those having privies should be made to keep them in proper condition. The open pits or sinks should have a layer of soil daily thrown upon the excrement. The two little market stalls should be kept perfectly clean, and daily examined by a sanitary officer. The main part of the work of preserving cleanliness should be done by private individuals. The only public expense would be paying a sanitary officer, and hiring a garbage cart. The whole public expense would be less than $100 a month.

In conference with Dr. Melon, the county health officer, I was assured that regulations covering the case would be made and the matter attended to at the expense of the county.

3. The following data, obtained from the custom-house, show the arrivals for fiscal year ending June 30, 1879, which is about the annual average for the past three years:

There were 44 coastwise vessels, 29 of which were from Louisiana, 4 from Texas, not including those from Louisiana, touching on the way; 6 from New York; 3 from Alabama. They arrived as follows: 4 in July; 2 in August; 1 in September; 5 in November; 5 in December; 6 in January; 3 in February; 5 in March; 4 in April; 4 in May; 5 in June.

From foreign ports 24, of which 16 were from England; 2 from Germany; 3 from France; 2 from Cuba; 1 from Mexico, (Tuxpan). They arrived, in July, 2; August, 1; September, 1; November, 3; December, 3; January, 2; February, 2; March, 2; April 3; May, 2; June, 3. Cargoes consist of assorted merchandise, wines, liquors, iron, and dry goods. No passengers last year. Average freight of English vessel, about 1,800 tons; Mexican, 36; Cuban, 477. Average crew of English, 35; Mexican, 5; Cuban 7. All English vessels have come via Vera Cruz and Tampico until the present quarantine at this port. About half of them will hereafter come direct, the others via Vera Cruz and Tampico, I am informed. Up to the 19th instant, quarantine station was located at Brazos wharf, nominally. Infected vessels were kept anchored just inside the bar, and crew, passengers, and cargo kept on board. The present station is on Clark's Island, one mile from Brazos wharf, and the same distance from the nearest inhabited house. One hospital tent and seven A tents have been furnished the quarantine physician for use as needed. There are about four square miles that can be used for quarantine purposes. "Have had no passengers (sick or well) at quarantine for the past three years, and have no regulations about charges for food, accommodations, &c."

"Quarantine is declared against all ports south of 25° North latitude, and against any other places where yellow fever or epidemic of other infectious disease is known to exist. Quarantine continues for whatever term the governor declares by proclamation. Passengers are generally detained twenty days from date of departure from infected port. The vessel and cargo are fumigated. Quarantine is imposed for yellow fever, kept here of vessels put in quarantine."

In this connection, your inspector calls attention to the case of the
Chase, of New Orleans, as detailed in the following extract from a le
the master. I find the statements substantially correct:

"On the 21st June, I cleared from Tampico, Mex., for Brazos Sant
clean bills of health; one from Mr. Cassard, United States consul, an
the Mexican authorities. Have a crew of four men, myself and wife,
sengers. In ballast, dunnage, fuel, and seven barrels of water. On
was boarded by pilot, and, on coming to anchor, was boarded by depu
inspector, A. B. Barton, who put my vessel under quarantine rule. Al
to remain in same condition until he communicated with the healt
occurred the 27th of June. On the 28th instant [should be June]
down and sailed around vessel, not coming within seventy-five yard
what he had to say, only part of which I could make out. He put a
and had quarantine flag sent to masthead. Would not come himself t
or crew. I asked permission to go on Padre Island to get exercise, b
He then retired. On Sunday, 29th, deputy inspector Barton and boat
antined, and sent to remain on my vessel during the term of quaranti
me seven persons to provision, besides myself, wife, and crew. This
my vessel a quarantine station. The reason given for having these s
board, was that there was no quarantine ground or building at this p
of July, Dr. Main made another flying visit in same style as previous
on board were complaining of wanting exercise. So I again begged p
on the island; was again refused, and told if I went ashore I would be
of $500. * * * My clean bills of health cost me $15. * * *
released out of quarantine after nineteen days close confinement, and
show effects of the close confinement we have been subjected to. I fu
my vessel's hatches were not closed from the 21st June until the day
(Signed) Henry Gibson, &c.

Barton inspected the vessel on the 27th June and went afterwards
where he and his boatman were arrested on affidavit of one Siebert, w
antine guard under appointment of the *county*. They were sent on b
Chase, and after expiration of quarantine were tried before justice of th
at Point Isabel, who discharged them for "want of jurisdiction."

"Previous to this year it was the custom to examine a vessel (leavin
a clean bill of health. It has not been the custom this year.

"Yellow fever occurred at Brazos Santiago in 1858 and 1867. The first
from Havana in coffee; the last time, thought to have been brought fr
city, Texas, to which place it had been carried from Corpus Christi i

tion as a guide and enforce it as best we can. No records of annual reports have been kept, and hence cannot be furnished.

"Expenses of quarantine establishment are to be defrayed by the State under the recent law.

"No special fees are charged for service in connection with quarantine inspection, except for fumigation of vessel. This fee is paid by the vessel or agent. The charge is so much a barrel or bale, and generally amounts to about $50 for large English steamers.

"There has been no resistance to collection of quarantine fees.

"No call has been made upon the National Government for aid through its military, naval, or revenue officers for the past three years.

"No quarantine has been established against diseases of the domestic animals." (Report of Dr. Combe, ex-quarantine officer.)

4. The defects of the quarantine at Brazos Santiago, up to the 19th July, were: (1 There were no accommodations whatever for taking care of passengers, crew, and cargo. (2) The quarantine physician had his headquarters at Brownsville, and was not easily accessible when needed. (3) There being no written regulations, everything was done in a loose, slip-shod, unsystematic way. (4) The nominal quarantine station was on Brazos wharf, the only place for non-infected vessels to land cargo and passengers.

The defects have been remedied as follows: (1) The quarantine station has been changed to Clark's Island. Tents have been placed there ready for emergency. Treatment of the cargo will be mentioned a little further on. (2) The quarantine physician now has his headquarters at Point Isabel. (3) No written regulations have yet been adopted. The local authorities here are in favor of adopting them, but are waiting to hear from the State health officer. For, should this board adopt less ultra measures than other ports, it is feared the latter would quarantine against this port "as a matter of prudence."

There are still other points that need attention in connection with the temporary arrangements. (1) The most serious one is the management of the cargo. There would be little trouble if only small coasting craft had to be quarantined. But large English steamers, bringing from four thousand to eight thousand barrels, come by Vera Cruz and Tampico. They want to transfer cargo and return to Liverpool. Their cargo has to be lightered over the bar. Cargo cannot be brought inside the bay and kept on the lighters, for there are not enough lighters in the harbor to contain the freight of one of the steamers. The only place it can be landed is Brazos wharf.

5. So there are but two places for managing the cargo for the present: (*a*) Not allow large vessels to enter their freight here, but have them take it to some port having a quarantine warehouse. Bills of lading are made out for such a contingency, and this plan was adopted here at one time. (*b*) Force the inhabitants of Brazos Island to leave or be placed in quarantine. Use Brazos warehouse for storing and disinfecting cargo, and make all non-infected vessels transfer cargo to lighters in the middle of the channel, to be taken direct to Point Isabel wharf. The warehouse and wharf on Brazos were used one quarantine season for the above purpose, but at that time (1878) no other than infected or suspected vessels arrived, and no one was living on Brazos Island. For the present it is impossible to say which of these plans the local board here will adopt. (2) A foot wharf, 100 feet long, should be built from dry land, on Clark's Island, out into the bay for landing passengers from skiffs. The cost would be about $100. (3) The question of salary of the quarantine physician at this port. He has been drawing a salary of $10 a day. The proclamation of the governor, dated July 14, 1879, seems to reduce it to $100 a month. The present incumbent refuses to serve for this; nor do I believe a competent man can be had for such a price. The question has been referred to the Attorney-General, and Dr. Main continues to serve until he is heard from. It would leave the quarantine at this port in bad condition should it be decided that the physician only gets $100 a month.

6. A proper quarantine cannot be concluded here without a permanent station, with warehouse and hospitals. In selecting a site special regard should be had for safety from the severe storms which are of almost yearly occurrence on this coast. The old town of Brazos Santiago has been completely swept away more than once. The last time only a few cabins and warehouses were rebuilt. In my opinion Clark's Island is the only place sufficiently isolated and giving any hope of security from storms. It is difficult of approach for even small vessels, which is the only serious objection. By reference to the sketch it will be seen that a very long wharf would only reach 3 or 4 feet water at the lowest tide. Add 18 inches for high-tide, and then only small lighters could reach the wharf. Still it could be made to do by using small lighters.

7. Twelve hundred feet of wharf, one warehouse, one hospital, and one house for passengers and quarantine officers' quarters would cost about $7,000 or $8,000, to be plain but substantial structures. If the same contractor should build several stations, &c., it would doubtless be done cheaper. I have seen it stated that a contract had been made for building five stations on the coast (one to be here) for $9,500. The State

authorities saw General Canales on the subject. The result was the
Dr. Combe, of Brownsville, quarantine physician at Bagdad, with p
own discretion in everything connected with quarantine at that port
and file of soldiers are furnished to carry out his orders. The Mexican
him nothing for this service. An effort is on foot, which will doub
have him paid something by contributions in Matamoras and Brownsv
$150 per month will be raised in this way. He has his headquarters
and couriers inform him of the approach of vessels.

12. The Mexican Government has no quarantine law, and everythin
eral Canales in the matter is arbitrary. The reasons inducing this
the part of the Mexicans I believe to be—(1.) A disposition of General
serve amicable relations with Americans. (2.) It is easier for com
through Brazos Santiago, thence by rail to Brownsville, and over to M
it would be to have vessels land at Bagdad and haul cargo thence b
true that in an emergency Mexican capitalists could purchase a steamb
Grande River from Bagdad to Matamoras, but such a contingency is re
revenues from the English steamers are important to the Mexican auth
six thousand dollars will be derived from this source within the n
General Canales is already borrowing money from Matamoras m
strength of this. Of course both the borrower and the lender are inter
Brownsville open to Matamoras. If Matamoras should become infecte
dad, Brownsville would close all commerce with Matamoras. (4.)
(Mexican and American) between Brownsville and Matamoras are wo
a month to their owners. Though the principal route of commerce lies t
ville via Brazos Santiago, there are small coasting vessels (of 40 to 5
at Bagdad on an average of one a month. They almost always co
ports, and generally bring coffee, sugar, and fruits; occasionally pass
itary stores. The schooner Mexican Eagle arrived at Bagdad a few d
foul bill of health from Tampico. She brought eighteen or twenty pas
them a brother of General Canales, with his family. They are now i
Bagdad.

And now I come to treat of a matter that has complicated and threat
all the quarantine under the jurisdiction of Brownsville, and particul
mouth of the river. On my arrival I found that politics and private
great measure influencing the action of city and county officials. T
county were each trying to get control of the quarantine. The
time been a private enmity between Drs. Melon and Combe. Each of t
was urged by respective friends as quarantine physician. Melon had a
the city and county boards; but it was discovered that he could not e
eration of the Mexican authorities, and Dr. Combe would not have of

this quarantine, to establish such regulations as will prevent the introduction of the disease by land." The two authorities do not pretend to co-operate with each other. My opinion is the county will withdraw its guards before long.

13. The necessities of the situation at the mouth of the river are that Dr. Combe shall continue to control quarantine at that point. If Matamoras merchants continue to pay him after they begin it, he will continue. If they do not, I am of opinion he will not feel obliged to leave his practice and attend to the quarantine. Should the Mexican soldiers under command of the quarantine officer prove treacherous or careless, the quarantine would be of little avail.

If some international quarantine could be provided for at this point it would be of immense advantage to commerce through Brownsville and Matamoras, for it would give greater security against infectious diseases at these two points.

The sanitary history, condition, and wants of Brownsville will be the subject of a special report so soon as I am able to procure the necessary data. There are very few records from which information could be gleaned. I have already reported that the local sanitary conditions were bad. Within the last week the authorities have been pushing with more vigor the work of cleaning up. There is no immediate want that the city is not able and willing to supply.

I have nothing from the State health officer (since my last report) on the subject of adopting at the ports in my district the quarantine regulations of the National Board of Health.

It is my intention to inspect the remainder of my district as rapidly as possible, and without attempting for the time to be as thorough as I have tried to be here. If by that time I should not have definite information from the State health officer on points referred to him, I shall attempt a conference with the view to a more definite understanding.

I am, very respectfully,

JNO. H. POPE,
Sanitary Inspector.

Dr. THOMAS J. TURNER,
Secretary National Board of Health, Washington, D. C.

CORPUS CHRISTI, TEX., *August* 2, 1879.

SIR: I have to report that I arrived at this place last evening, and received two packages of National Board of Health Bulletin, June 28, forwarded to me.

My departure from Brazos Santiago was delayed until Wednesday, July 30. The ship in which I had expected to take passage for Indianola had its orders countermanded, and did not touch at Indianola. No vessels from Brazos touch at any point on this coast, except Indianola and Galveston. The irregular communications have been rendered worse by the late quarantine of New Orleans by Galveston and the more recent occurrence of yellow fever at New Orleans.

Brazos Santiago quarantined against New Orleans on the 30th ultimo. When I left that port preparations were being made to quarantine the steamship Hutchinson, then *en route* with freights from New Orleans. The people on Brazos Island were being removed, with the exception of the pilot's family. The warehouse at Brazos wharf was to be used for transferring cargo and fumigating. Goods generally considered most dangerous (such as those included in "first class" under section 12 of quarantine law of the port of New York) were fumigated as well as circumstances would permit. Other classes of freight would be passed with very little delay. Any sick passengers were to be cared for on Brazos Island. The well were to be accommodated in tents on Clark's Island.

In my report of 23d July, I submitted an approximate estimate of wharf, warehouse, &c., on Clark's Island. The estimate was intended to include the cost of site. Colonel Haynes, collector of customs at Brownsville, was then trying to find out for me the owner of the property. He only ascertained on the eve of my departure that the title (by him considered valid) was in a lawyer named Powers and a merchant named Pturia, both of Brownsville. One of the parties was absent, and he could not tell what price he valued the property at.

In a conversation with Mr. J. Gomila, agent of Morgan's steamship line, and manager of the Rio Grand Railroad, I stated the difficulties attending the building of a warehouse for quarantine purposes at any safe point in the harbor of Brazos Santiago. He expressed himself as desirous of assisting any effort to carry out a rational quarantine; stated that he had no doubt that those interested in the transportation lines at that point would build a warehouse on Padre Island, and allow the one on Brazos to be used for quarantine purposes free of cost to the quarantine authorities. He did not say they would rebuild it at their own expense should it wash away in a storm. This arrangement would suit very well in connection with accommodation for passen-

to personally inspect affairs there. I left with the health authorities
most of the points on which I desired information, and answer is promi
I return next week.

Only small sailing vessels come to Corpus Christi, and these generall
ola. A channel is being dredged through the bulkhead at Corpus Cl
no vessels enter there yet. Aransas Pass has little more than 4 feet o
bar at ordinary tide.

The quarantine station is at Shell Bank (inside Aransas Pass), which
the only route from here to Indianola. I shall be unable to report on
this port until I visit the quarantine station, as the quarantine physici
books and records there, about 20 miles from Corpus Christi.

The evils of a want of uniform quarantine regulations and co-oper
the various local boards in this district are more apparent than ever
yellow fever have been reported in New Orleans. Indianola has not qu
Orleans (July 31). The town of Cuero, on the railroad from Indianola
sent word to the mayor of Indianola that Cuero would declare quar
Indianola if the latter port did not restrict communication with New
health authorities of Corpus Christi seem inclined to quarantine Ne
speak of quarantining against Indianola unless that city does the san
present circumstances it is impossible for a passenger leaving one of th
foresee whether he will be quarantined at the next. I am mindful of t
the settlement of these differences to the State health authorities; but
no cognizance of the matter until the overt act is committed, then the
ities must make personal investigation into the merits of the case be
can be rendered. By the time the health officer could reach some of th
district, and the decision could be made, an ordinary quarantine wo
exhausted.

August 3.—Learning there was no mail leaving here after six o'clock
six o'clock to-morrow (4th), I have kept open this report until after th
ing of the city council to consider the adoption of the quarantine regu
National Board of Health. The council passed a resolution adopting t
tions, subject to the approval of the State health officer, with such a
regulations as may be deemed necessary for this port. I have requeste
resolutions, which will be forwarded to your office in due time.

The city council also declared quarantine against New Orleans and
and placing restrictions on all goods leaving those places after August 1
to be a strong disposition to quarantine Indianola, unless that port re
merce with New Orleans.

I have only partially examined into the sanitary condition of Cor
have inspected the streets as to cleanliness and drainage. The natu
excellent, but the gutters are not kept sufficiently open. In that porti
inhabited by the better classes, the streets are generally kept clean;
urbs of the town farthest from the bay, inhabited principally by Mexi

briskly." Some local rains have occurred. At Indianola I was informed that a considerable shower fell there a day or two before my arrival. On my way from there to Corpus Christi we passed through a shower of short duration, after which our little vessel was becalmed for ten hours.

I have the honor to be, very respectfully, yours,

JNO. H. POPE.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

Shell Bank, near Corpus Christi, Texas,
August 6, 1879.

Sir: As a result of inspection of quarantine at port of Corpus Christi, I have to report as follows:

The present station is at Shell Bank, an island 23 miles northeast of Corpus Christi, inside of Aransas Pass (see inclosed sketch of harbor). It is immediately on the channel from Aransas Pass to Corpus Christi, and from Indianola by the inside bays to Corpus Christi. It is also on the only approach to Rockport by any pass south of Saluria (off Indianola).

The station is on shore, and consists of only one house, used by the quarantine officers, and a small out-house used by his boatman. The nearest inhabited dwelling, not connected with the quarantine station, is on Hog Island, two miles off. There are no hospital accommodations. About 25 acres of the island can be used for quarantine purposes. The remainder is too low and subject to overflow.

All ports and countries south of north latitude 25° are quarantined for the time specified in the proclamation of the governor of the State, whether the bill of health be clear or foul. The diseases quarantined are yellow fever, small-pox, cholera, plague, and typhus fever. Occurring during transit, they would not only render the individual, but the vessel, subject to quarantine.

The following is a tabulated list of all the vessels put in quarantine at this station of which any record has been kept:

List of vessels put in quarantine at port of Corpus Christi, Tex.

Whence coming.	Name.	Length of voyage.	Date of arrival.	Bill of health.	Causes of detention.	Length of quarantine.	Number of crew.	Number of passengers.	Cases of diseases.		Cargo, nature of.	Remarks.
									On board.	In quarantine.		
Morgan City	Steamship Mary	48 h'rs.	1876. Oct. 2	Clean	Suspected	Fumigated and detained 8 hours.	20	None	None	None	General merchandise.	
Jamaica	Schooner A. W. Collins.	16 days	1878. June 27	do	do	Fumigated and detained 12 hours.	8	do	do	do	Bone dust	
Morgan City	Steamship Aransas	2 days.	Aug. 2	do	do	4 days lightering	20	do	do	do	General merchandise.	Returned to sea.
Tampico	Schooner Lottie Mayo.	5 days.	Aug. 14	do	do	7 days	4	1	do	do	Fruit	Do.
Lighter for Aransas.	Schooner Ripple		Aug. 5		Freight from Aransas.	17 days	2	1 in charge of freight.	do	do	General merchandise.	
Do	Schooner Aquis		do		do	do	2	None	do	do	do	
Do	Schooner Emma Clara.		do		do	do	2	do	do	do	do	
Do	Schooner Two Brothers.		do		do	do	2	do	do	do	do	
Do	Schooner Flour Bluff.		do		do	do	2	do	do	do	do	
Do	Schooner Alice		do		do	do	2	do	do	1 case malarial fever.	do	
Do	Schooner A. L. Fitch.		do		do	do	2	1 in charge of freight.	do	None	do	
Calcasieu, La	Schooner Susanna	20 days	Aug. 28	Clean	Suspected	3 days	3	None	do	do	Lumber	
Sabine, Tex	Schooner Rost	17 days	do	do	do	do	3	do	do	do	do	
Calcasieu, La	Schooner Moeling	17 days	do	do	do	do	3	do	1 case malarial fever.	do	do	
Do	Schooner P. Andrew.	11 days	Aug. 29	do	do	8 days	3	do	None	do	do	
Do	Schooner C. J. Gill	11 days	Aug. 31	do	do	9 days	3	do	do	do	do	
Sabine, Tex	Schooner None Such.	6 days.	Nov. 1	do	do	14 days	3	do	do	do	Shingles	
Calcasieu, La	Schooner Moeling	11 days	do	do	do	9 days	3	do	do	do	Lumber	
Orange, Tex	Schooner Garnock	12 days	do	do	do	8 days	3	do	do	do	Shingles	

No vessel has ever arrived here with medical officer on board.

Ports which have been infected, but where the disease has been officially certified to have ceased, and clean bills of health are issued; the arrivals from these are still quarantined for eight or ten days longer.

No instance of spreading of disease has ever occurred at this quarantine establishment. No cargo has ever been landed here. Cargoes are fumigated on the vessel or on lighters. The officer here has no knowledge of any cargo or portion of cargo being injured by the means used for disinfecting and fumigating.

When sickness occurs on vessel in quarantine, medical assistance is rendered by the quarantine physician. There is no regulation about payment for it. In one or two instances the bill for services to crew was sent to the collector of customs, but was not paid.

All arrivals from infected or suspected ports are inspected as regards cleanliness and ventilation. If condition is bad, the vessel is thoroughly washed with salt water, then with carbolized water; then fumigated (heretofore with chlorine gas); then ventilated as thoroughly as possible. Record is kept of sanitary condition of vessels in quarantine.

Inspection is always made and certified to of vessels leaving this port before clean bill of health is issued. The inspection applies to crew and passengers also.

Yellow fever and small-pox have occurred at Corpus Christi. The former in 1867; the latter was prevalent in 1876; but on several occasions a few cases have occurred. The yellow fever is said to have been introduced from Indianola, in 1867, by passengers. Your inspector is trying to obtain definite information concerning the first cases, but was not able to complete investigation before leaving Corpus Christi.

The quarantine physician reports one case of evasion of quarantine. During 1876 the schooner Fairy passed the station in the night and went to Rockport. She was brought back by the revenue cutter the next day, by request of the quarantine officer. The master of the Fairy disclaimed any intention of violating a law. No penalty was inflicted.

Quarantine by land was established in infected and suspected places in 1878. Guards were placed on all the roads approaching Corpus Christi. He thinks "such measures advisable in times of great danger, but believes it is very difficult to make an inland quarantine effective against any organized attempt to evade it." There was no evasion of the one in 1878, so far as known to the quarantine physician.

I inclose copy of quarantine regulations now in force at this port; also the sanitary regulations in force at Corpus Christi.

The expenses at this quarantine station have been paid by the quarantine physician. Heretofore he has not been reimbursed. The quarantine physician's salary is $10 per day, paid by the State. A charge of $10 is made for fumigating, which is collected from the vessel. The quarantine physician furnishes his own boat and pays his boatman $50 a month. He has no quarantine guards. Revenue Collector Paschal was called upon in the case of the Fairy mentioned above and rendered assistance as stated.

No quarantine is imposed against diseases of domestic animals.

There should be furnished, as soon as possible, accommodations for sick and well passengers. Tents could be used for this purpose. Accommodations for about twelve persons would be sufficient. There is a quarantine guard, under pay of the State, at Corpus Christi Pass, stationed on head of Padre Island; but all passengers, both sick and well, should be quarantined on Shell Bank Island.

The Bulkhead at Corpus Christi Pass is being dredged. Should this succeed, and the pass be opened to sufficient depth to admit sea-going vessels, nearly all vessels for Corpus Christi would probably enter by that pass. In such event a permanent quarantine station would be more conveniently established there. I have not personally inspected the surroundings, but am informed that the harbor side of Mustang Island is a convenient site for a quarantine station. Appropriation has been made by the State for building permanent warehouse, &c., for quarantine purposes at this port, but I am not informed as to what is being done toward erecting the buildings. If the permanent station is made at Corpus Christi Pass a guard at Shell Bank would protect the only other avenue of approach to Corpus Christi and Rockport.

Between Saint Joseph's Island and Matagorda Island, about 30 miles above Aransas Pass, is a narrow bayou connecting the Gulf with the bay. I will not have opportunity for the present of personal inspection of this place. I am informed by some parties that it would be passable for small schooners, such as those from Tampico, to anchor on the Gulf side and lighter a cargo through this bayou, and thus send freight to points on the mainland. Other parties say that, while lighters could go through the bayou, the inside bay opposite this point has no channel containing more than 18 inches of water at ordinary tide. There is no quarantine guard at this bayou.

The necessary buildings for a permanent station at this port would cost about $3,000. Cost of the site would depend on location. If at Shell Bank, the island could be bought from present claimant (heir of ——— Thurman) for about $500, including the buildings now on it. If Mustang Island (lower end) should be selected, *Be it ordained by the mayor and council of the town of Cedar Keys as*

1st. That the quarantine ground shall be and is hereby establi
channel running from Sea Horse Key to or in the direction of Snake
half a mile from and east of the eastern edge of the main ship cha
and extending to and including Snake Key, and that a stake be put
which said quarantine ground commences on each side of said Snal
each of which stakes a suitable flag shall be put up while quarantin

2d. That it shall be unlawful for any boat or vessel arriving at
port where any contagious, infectious, or pestilent disease was pre
of the departure of such vessel therefrom, or upon which any such d
within thirty days preceding the arrival of said vessel or boat at
Keys, to approach nearer to the town of Cedar Keys than the quaran
in the first section of this ordinance, and no person or goods shall b
said vessel or boat until said vessel or boat shall have performed qu
to law.

3d That there shall be appointed by the board of health of the to
in May of each and every year, one port inspector, who shall be pai
ury of the town of Cedar Keys upon the order of the mayor, setting
performed, such fees as the board of health may direct.

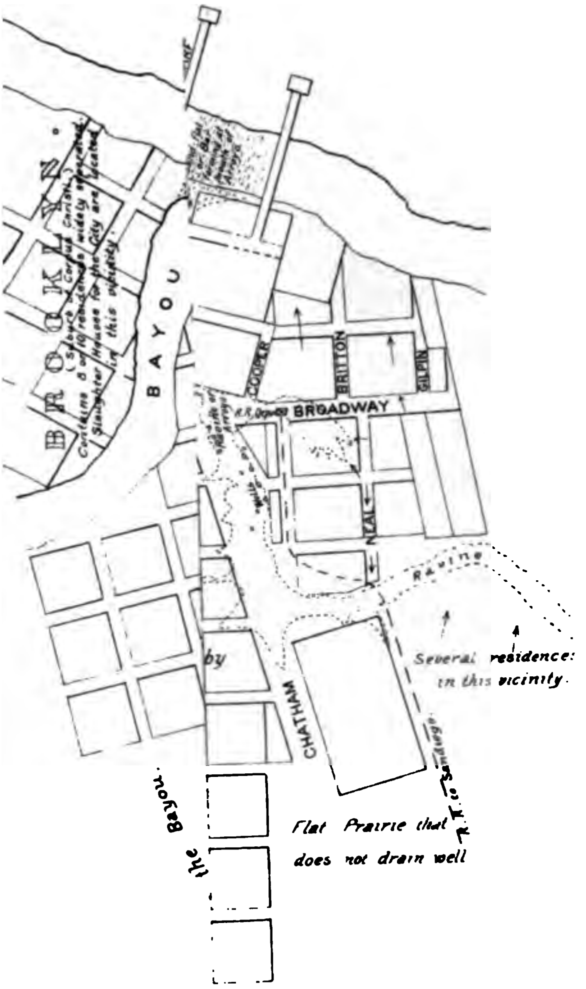
4th. That all vessels arriving at the port of Cedar Keys shall p
health the following fees for inspection; that is to say, all vessels
shall pay $5; all vessels from ports within the United States over 70
all vessels from ports in the United States under 70 tons and over 10
and for vessels under 10 tons no charge for inspection shall be mad

5th. That any boat or vessel that may approach nearer to Dep
time the quarantine laws are in force, without the written perm
inspector, than a point in the main channel south of Grassey Key,
the east end of Dog Island, or a point in No. 4 channel north of the no
of North Key, if bound to the north side of Way Key, or, if bound t
Way Key, nearer to the railroad wharf than the black buoy in the n
shall, on conviction before the mayor of the town of Cedar Keys, b
over $100.

6th. That in May of each and every year, or as soon thereafter as t
for the town of Cedar Keys may think necessary, a port physician s
who shall be paid by said board of health such sums as may be agree
That if, in the opinion of the board of health, one person can fill th
port inspector and port physician the two offices shall be combined

7th. That any vessel that may require fumigation shall pay there
health for said service 5 cents per ton if of 100 tons burthen or und
tons shall pay $5 for said service.

8th. That any person who shall go on board any vessel and leave


BROOKLYN
(Suburb Corpus Christi.)
Contains 8 or 10 residences widely separated. Slaughter Houses for the City are located in this vicinity.
BAYOU
Bar
COOPER
BRITTON
GILPIN
R.R. Depot
BROADWAY
NEAL
Ravine
Wells in bed of Arroyo
by
CHATHAM
Several residences in this vicinity.
R.R. to San Diego
the Bayou
Flat Prairie that does not drain well

COR

References:

Broadway is line of the irregular Bluff.
The "Beach" lies between Broadway and Corpus Christi Bay and the Bayou.
The "Bluff" is that portion of town west of Broadway.
Compactly built portion of the town is on the Beach, from Star St. on the north to Cooper St. on south. Many Houses flat on the ground. Nearly all the Stores and a goodly number of dwellings here.
→ Arrows show direction (general) of the drainage.
• Wells in bed of arroyo.
‥ Shows approximate outline arroyos or Ravines.

otherwise protected, except by planting a kind of cane or some small-growth bushes around the edges. Many of these tanks have the privies located near the edge, or the ditches leading to them run close to the privy. They are dry from the late drought; and I noticed many of them in which filth, of almost every description, was accumulating. Whether they were to be cleaned when clouds portended rain I cannot say, but the evidence of uncleanliness to be seen everywhere about the premises of some of these people prepares me to believe the most revolting probabilities. The large ravine, or arroyo, drains a good deal of the city inhabited by this class.

Privies are used by all the better classes. Most of them have vaults or pits, not walled. But there are many of them where the excrement is deposited on the surface. Where they have pits dug they are generally about 3 feet deep. The sanitary regulations of the city and the proclamation of the health committee and physician will show the means adopted for abating nuisances of all kinds. I made special inquiry as to the management of the privies. I was told that during the summer months attention was called to the ordinances by publication. It was made the special duty of inspectors to see that the health ordinances were obeyed. Citizens were also requested to report any nuisances. A large proportion of the people, generally the lower class, do not co-operate with the health authorities, and the result is that the enforcement of the laws has proved to be a difficult matter. I have found everywhere that too much consideration is felt for those who are careless about keeping their premises clean. The sanitary regulations of the city and the proclamation of the city physician were forwarded with my report on the quarantine at Corpus Christi, and they are hereby made a part of this report on the sanitary condition.

Cistern water is habitually used. The recent continued drought has forced all, with few exceptions, to resort to well-water. This is supplied from 15 or 20 wells dug in the dry bed of the arroyo. The water sells at 20 to 30 cents a barrel. The wells are from 5 to 35 feet deep, according to their location; the shallowest being nearest the outlet of the arroyo. I have already said enough to show the objection to this water supply. It is a fortunate thing that the same rain that washes filth into the arroyo to contaminate the wells also replenishes the cisterns, and thus renders most of the people independent of this mode of supply.

There is one market in the city, regulated by city ordinances. I found it kept in good condition. Open from 4 to 7 o'clock a. m. during the summer, and until 8 o'clock a. m. during the winter.

The slaughter-houses are 2 or 3 miles north of the town. About 15 beeves daily are slaughtered.

Only dry hides are kept in the town. Dead animals are hauled off as a rule, but I found at least one exception to this in the Mexican portion of the town, where a dead dog had been allowed to decay in the street.

It can hardly be said that any disease is now prevailing here. There are a few cases of malarial fever on the northeast part of the bluff. Yellow fever occurred here in 1854, imported by schooner or the steamship Fashion from New Orleans. The deaths were about 30 out of a population of 1,000. Again, in 1867, it was imported by means of a passenger from Indianola, Texas.

Small-pox has appeared several times, but has been promptly arrested by isolation. There have been five or six cases of typhoid fever during the last five or six years. Puerperal diseases are rare. Erysipelas is almost unknown. Trismus nascentium was at one time of frequent occurrence; there has been but little for the past year. Neuralgias are frequent. Tetanus, following injuries, is of frequent occurrence. Surgical operations do well, wounds healing rapidly as a general thing. There is a small hospital, the enterprise of Drs. Spohn, Burke, and Hamilton. The county and city pay the rent of the building, which entitles them to a certain number of patients free of charge.

In my opinion, immediate attention should be given to—(1) A thorough cleaning of the surface; a removal of all refuse and garbage from the streets and about the premises of the people. (2) All the privies should be thoroughly cleansed and kept so. (3) The Mexican population should be forbidden to drain the streets into their tanks which supply them with drinking-water. This is an innovation that they would violently oppose; but it is time their education was begun. All refuse or filth that can be moved should be carried beyond the limits of the town, to northwest; all that can be should be burnt. If the sanitary regulations of the city are energetically and perseveringly enforced, they appear to be sufficient to meet the requirements.

I should think that $1,000 would be sufficient to put the city in good condition for the present. This estimate contemplates that a majority of the citizens can be made to carry out the law requiring them to clean their own premises.

Any permanent improvements should have in view the grading of some portions of the beach, keeping open the drains, cleaning privies without vaults, and forcing owners to keep them clean, and a large sewer draining the arroyo from the bluff across the beach and sufficiently far out into the bay to insure its being beyond the lowest tide. An engineer would be the only one who could give near a correct estimate of vaults. Cistern water is used.

This place is protected by the quarantine at Shell Bank, near Ar
controlled by Corpus Christi, and by quarantine at Indianola.

Fulton is on the same shore of Aransas Bay, 4 miles above. It
four hundred people, nearly all employés of the beef packeries in op
has a warehouse and wharf; small vessels touch here on their route
between Indianola and Corpus Christi. I did not have opportunit
sanitary condition of the packeries during the short stay of the pass
My information from a citizen of Rockport is that they are kept in g

Very respectfully,

JNO.
Sa

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

P. S.—I inclose resolutions of common council of Corpus Christi,
the State health officer.

At the special session of the city council of the city of Corpus Cl
mayor's office in said city on the 2d day of August, 1879, the followin
upon "The Regulations of the National Board of Health," as prese
Pope, M. D., inspector for the National Board of Health of the Unite

Resolved by the city council of the city of Corpus Christi, That, having
ered the regulations of the National Board of Health, we accept and
with such minor additions or modifications as may be required to a
locality.

And it was further

Resolved, That we pledge our hearty co-operation in establishing sa
soon as they are sanctioned by the health officer of this State.

On motion, a vote of thanks was passed, expressive of the apprecia
cil of the careful and thorough investigation made by Dr. Pope into
sanitary matters and vital statistics, and for his representation of th
operations of the regulations of the National Board of Health, and
and kind attention.

On motion, the city secretary was instructed to furnish Dr. Pope w
action had in the premises by the council, signed by the mayor and
the seal of the city.

JOHN M.

used as habitation by the quarantine physician and his boatmen, and a small boat or skiff. It is at least 5 miles from any inhabited dwelling. There are no hospital accommodations. The passengers and crew of any vessel in quarantine are kept on board the ship. All ports south of 25° north latitude are quarantined by the governor's proclamation. The diseases quarantined are yellow fever, small-pox, cholera, plague, and any other contagious or infectious disease. Length of quarantine—twenty days.

"No vessels have been put in quarantine during the last three years." No difference is made in favor of vessel having medical officer on board. When a disease rendering all arrivals from a given port subject to quarantine has been officially certified to have ceased, and clean bills of health are issued, the vessel showing clean bill of health and no sickness on board is allowed to enter. The quarantine physician would give all necessary attention to any sick on board during quarantine without public cost. Inspection is made as to cleanliness and ventilation of vessels arriving from suspected port. If found in bad condition disinfectants are used by quarantine physician, or in his presence. Vessels leaving this port are *not* inspected before giving them clean bill of health.

Yellow fever was imported into this place by fruit schooner from Tampico, Mexico. The first cases are said to have been from blankets taken from said schooner and sold at auction. There has been no infraction or evasion of the quarantine. Quarantine measures by land are provided for in the city ordinances; but none have been attempted, as there was no occasion to enforce the ordinances.

The expenses of the quarantine establishment are defrayed by the State. Fees are charged for disinfecting vessels at the rate of $4.50 per vessel, collected from the commander of the vessel or his agent.

Authority or assistance of any of the departments of the United States Government has never been needed nor asked for, except the placing of a deputy customs officer at the quarantine station for the purpose of receiving and clearing the ships lately in the Havana cattle trade. [For more special report of this see below.] There is no quarantine against diseases of domestic animals.

A tracing showing the topography of the harbor will be forwarded as soon as possible. Your inspector is of opinion that the station and quarantine establishment should be at Alligator Head, on the opposite side of the ship channel, and a little nearer Indianola. I am informed that sufficient land at this point could be bought cheaply. The establishment should consist of warehouse and wharf, officers' quarters, and at least one hospital, and quarters for isolating passengers not sick. The probable cost would be about $4,000.

At a meeting of the board of aldermen August 3, 1879, the following resolution was adopted: "On and after August 2, 1879, strict quarantine will be enforced against all Louisiana, Mississippi, and Alabama ports."

I call your attention to the inclosed cutting from the Daily Galveston News. I also inclose a copy of the regulations alluded to in the correspondence between the mayor and the governor of the State. The facts, as far as I could ascertain, are about as stated by the mayor. The only material omission in his statement is that one of the brakemen belonging to the railroad train was stationed on the wharf opposite the ship, and on the other side of the train, for the purpose of signaling the engineer when the car door was opposite the chute where the cattle were unloaded.

If the restrictions imposed by these regulations are *rigidly enforced*, and the cars, after being unloaded, are carefully inspected, to see that nothing is smuggled from the ship, and the wharf is kept clean before and after each shipment, the danger, it seems to me, would be *very, very* slight. If, in addition to the precautions at Indianola, the ship, before clearing from Havana, could be inspected, and the fact certified by a competent and reliable officer at that port, there seems to me no reason why the trade should not go on. The cattle-shipping at this port is the most important item of its commerce at this season of the year. The number of cattle shipped averages about five hundred a week.

I think a majority of the intelligent people of Indianola are in favor of a rigid, but rational quarantine. There are some, however, who make light of any attempt at quarantine; in other words, they are anti-quarantinists. I found a larger proportion of them at this port than any other. The only physician now left in the town, since the quarantine physician remains at the station, is a dogmatic believer in the domestic origin of the yellow fever. This feeling among the influential would naturally create a sympathy for persons evading or attempting to evade the quarantine. The officers and quarantine guards should be men who would rigidly and fearlessly enforce the regulations. I am informed that Dr. Macauly, the present quarantine physician, is an efficient officer. If it should be the province of the National Board of Health to recommend the appointment of any of the subordinates, I respectfully suggest that special view be had to avoiding the local influences.

The points in my district that I have not visited are: (1.) An entrance at the mouth of Caney Creek, some 10 or 15 miles up the coast from Matagorda Bay and thence by a canal from Caney Creek to the head of Matagorda Bay. It was reported to me by a captain of a small sloop (Cuckoo) running between Indianola and Matagorda, t short time since a small sailing vessel came through by this route to Matagorda vessel was from Galveston; but it shows the possibility of small coasting vess lighters entering here unchallenged. Mr. Prouty, collector of customs at Indian had soundings made at the mouth of Caney Creek, and informed me 4½ feet of w were found. I think this point should be protected by a quarantine guard. I h intended to make personal inspection of this channel, but the weather has bee threatening and the bay so rough that sailing in the small vessels going to Matag is precarious. (2.) The mouth of San Bernard River, some 30 miles farther up coast from the mouth of Caney. This point is protected by a quarantine guard. Velasco, at the mouth of Brazos River, still higher up the coast, also protecte quarantine guard. (4.) San Luis Pass, at the southwest end of Galveston Island, p tected by a quarantine guard.

Unless otherwise instructed from your office, it is my intention to return to Cor Christi, and possibly to Brownsville, to complete some unfinished work in connec with the sanitary report on those places. I requested parties in Brownsville to co plete some investigations for me and forward them, but I have heard nothing fr them since. My special report on the sanitary condition of Brownsville is delayed want of these data. I have reported, in a general way, that its sanitary condit was bad; but, as the local authorities had gone to work and were improving it, I h no recommendation to communicate to your office requiring immediate actio there is no ship by which I can reach Corpus Christi or Brownsville this week, I sh attempt to visit, by land, San Luis Pass, mouth of Brazos River, and mouth of S Bernard River.

As a result of my observations in this inspection district, I would characterize th quarantine here as a civil blockade. We cannot blame the local authorities for th when we recall how few facilities there are at any establishment. Not one of the has a place to care for the well or the sick nor a place to store cargo. The offic could only tell the vessel that she could not enter, and that she would have to ma the most of it.

Another impression I have is that the health authorities depend for protection entirely on quarantine. Their attention is drawn off from sanitary measures. Th point to their immunity from any prevailing disease as a sure indication of the cl anly and otherwise good sanitary condition. So long as the town is healthy, manner of filth is allowed to lie on one part or another of the surface of the pla Even some of the intelligent physicians seem not to appreciate that, year by year, soil is being prepared where an accidentally-introduced disease "germ" shall find conditions to decimate the people there.

There seemed to be a decided feeling, at every point I visited, in favor of co-ope tion with the National Board of Health. Some of the health authorities even desir the entire transfer of control to the National Board, so as to remove quarantine, as as possible, from local self-interest or prejudice.

It gratifies me to state that your inspector was everwhere cordially received by t health authorities, and valuable aid rendered him by them, and often by individu citizens.

I have the honor to be, very respectfully, yours,

JNO. H. POPE.
Sanitary Inspector.

Dr. T. J. TURNER.
Secretary National Board of Health, Washington, D. C.

P. S.—I inclose the official action of the board of aldermen, approved by the St health officer, adopting the National Board's quarantine regulations.

CITY COUNCIL ROOM, CITY OF INDIANOLA,
August 8, 1879

At a special session of the city council of the city of Indianola, held at the c council room thereof, the following, among other, proceedings were had, viz:

* * * * * * *

Resolved (upon motion unanimously carried), That the rules and regulations for sec ing the best sanitary condition of vessels, steamboats, including their crews, pass gers, and cargoes, going from any of the ports of the United States where yell fever exists, and also the rules and regulations recommended to be adopted and obser at all ports in the United States which are or may be designated as quarantine tions, and as adopted by the National Board of Health of the United States, approved by his excellency R. B. Hayes, be, and they are hereby adopted by t oard; subject, however, to the approval of the State health officer and the governor f the State of Texas. * * *

A true copy from the minute-book A, p. 434.

C. W. SHORT,
Mayor City Indianola, Tex.

Attest: F. C. ROHRE, *City Recorder.*

Approved August 11.

R. RUTHERFORD, *S. H. O.*

CITY COUNCIL ROOMS, CITY OF INDIANOLA,
July 26, 1879.

At a special session of the city council, held in and for the city of Indianola, a lawful quorum being present, viz, * * * the following, among other, proceedings were had: * * *

F. J. Deck, chairman of the committee to draft resolutions in regard to quarantine regulations, presented the following; which resolutions, having each and all been passed upon and adopted separately, by unanimous vote, and afterwards adopted *in toto* as presented, were ordered spread on the minutes of this board, and reading in words and figures as follows, viz:

Be it resolved by the mayor and board of aldermen of the city of Indianola in city council assembled, That from and after this the 25th day of July, A. D. 1879, the following be, and they are hereby, adopted as the regulations governing health and quarantine officers, relating to traffic between the port of Indianola and the several ports of the Island of Cuba, viz:

1. All vessels plying between this port and any of the ports of the Island of Cuba, engaged in the carrying of cattle from this port to any of the Cuban ports, must be boarded for entrance and clearance at the quarantine station near Paso Caballo Bar by a deputy collector of customs of the United States, permanently stationed there for said purpose during the present quarantine period, and whose duty it shall be to make and deliver to the commander of such vessel or vessels, after examination by the health officer at said station, all necessary papers for entrance and clearance.

2. The deputy collector, so appointed under section 1 of these resolutions, must remain at said quarantine station during the whole time that the quarantine regulations and laws are in force for this year, and is not permitted to leave the same for the purpose of coming to this place until officially notified of the raising of the quarantine for the year 1879.

3. Said deputy collector must apply through the health officer at said station for any and all things, provisions, &c., he may need, to be sent to him on the same boat carrying the provisions, &c., to the quarantine station.

4. No vessel having been entered by such deputy collector is permitted to come any closer to any of the wharves at Indianola than 3 miles east of Morgan's wharf, and there lie at anchor until the cattle are ready for shipment; and, while at her anchor ground, no person is permitted to come near such vessel, or have any communication whatever with it.

5. Whenever such vessel is signaled to receive her cargo of cattle she shall land alongside the T head of the wharf and next to the railroad track, during which time no person, excepting as hereinafter provided, is permitted to remain on the wharf, and the guard, or any of his lawful deputies acting for him, is hereby instructed to make any and all vessels then lying at the wharf while she is loading remove to a distance sufficiently remote therefrom to prevent communication, where such vessel, so sent away from the wharf, shall remain until the departure of the vessel or vessels so loading.

6. None of the officers or crew belonging to any of the vessels placed under the restrictions as herein provided is permitted to come north of the railroad track on said wharf, nor any closer to shore than necessary to remove cattle from the cattle cars on the wharf.

7. In delivering the cattle aboard said ship entitled to receive the same, the engine or locomotive propelling such cattle cars must be in rear of them, and no person whosoever, while such shipping is going on, is permitted to go northeast of the Morgan's wharf office on said wharf, save the engine-driver and one brakeman, who shall come no closer to the vessel than actually necessary in the discharge of their duties.

8. Any person violating any of the provisions of sections 4, 5, 6, and 7 of these resolutions, shall be deemed guilty of violating the city ordinances of the city of Indianola, and, upon conviction before the mayor of said city, shall be fined in a sum not less than $10 nor more than $100.

9. The guard or any of his lawful deputies are hereby especially charged to carry out strictly the provisions of the foregoing resolutions, and are directed, as far as practicable, to abide by them themselves.

10. The expenses for guarding and enforcing these laws are to be paid by th
gan line of steamers (being the vessels engaged in said trade) as above sta
shall be no less than $5 per day or fraction of a day while at the wharf loadin

11. All employés, agents, &c., of the Morgan line of steamers, or of the Gulf, W
Texas and Pacific Railway Company, or any other person whomsoever, are
included as subject to the prohibitions herein.

12. Communications between said vessels and wharf or shore shall be by
only.

13. No mail matter of any kind, or anything else, is allowed to come on sho
any such vessel; nor is anything permitted to be sent aboard excepting necess
life, &c., which must be sent on some of the cars delivering the cattle; and th
on verbal order given to the guard or any of his deputies acting for him; whi
cer is not allowed to come closer than 50 feet to such vessel while receiving such
and on the north side of said wharf office.

14. None but the ship's crew of such vessels is allowed to received cattle fro
cars, and while receiving same are not permitted to come north of the railroad
and said crew shall consist, as far as practicable, of men acclimated to the cou
which yellow fever annually prevails.

15. Before the landing of any such vessel or vessels at the wharf, all cars
kind or description must be removed from the wharf, and the warehouse on the
be closed, and it is hereby made the especial duty of the officer charged wi
enforcing of these regulations to see that they are strictly complied with by all
concerned.

16. Any and all regulations heretofore passed in regard to quarantine, and
conflict with these regulations, and all orders, as heretofore issued, or hereaft
issued, by the State health officer enforcing quarantine, and not included her
hereby understood to be embodied herein.

17. The city council reserves the right to appoint a special guard to enfor
quarantine restrictions, subject to the orders of the mayor and board of ald
and the mayor and board of aldermen are hereby authorized to discharge an
so employed in case of his failure or neglect to discharge his duties.

18. None of said vessels is permitted to land at the wharf to receive said cattl
during the hours between sunrise and sunset; and she must receive her full ca
depart from said wharf on same day.

A true copy from the minutes of the minute-book of the city council of In
pp. 428, 429, and 430.

C. W. SHOR
Mayor of the City of Indi

GALVESTON, TEX., *August* 13,

SIR: I have the honor to submit the following report upon the sanitary cond
Indianola, Tex. Latitude, 28° 32′; longitude, 96° 38′. Average height abov
tide, 6 feet. Highest point, about 12 feet.

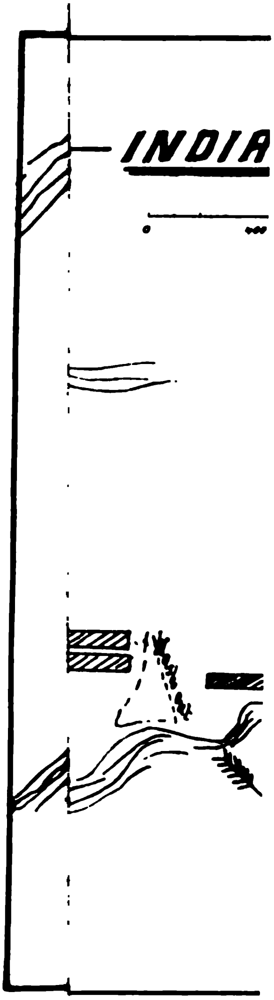
Indianola was founded in 1857; incorporated in 1859. The population in 1
about 2,500. In 1875 it was estimated to be over 3,000.

Since destruction of the city by cyclones in 1875, the population has bee
900; 700 being whites and 200 negroes. About half are foreign-born.

The town is built on a long narrow peninsula of shell and sand, between Ma
Bay and Powder-Horn Lake and Bayou and continuous marshes. The variatio
is a little more than one foot, unless affected by winds; being highest during
winds. The tide is about the same on the two sides of the peninsula. The cu
the bayou is said to average about three miles an hour.

There is practically but one street (Main), 70 feet wide, besides the cross st
feet wide, and the alleys, 20 feet wide. Main street runs along the highest pa
town, the surface sloping slightly from this line toward the bay and the l
marshes.

The storm of 1875 drove the water across the peninsula with such fury as
ravines or large gulches in many places. In some places channels have been
out to a depth several feet below low tide. These contain water. Some of th
gulches contained water until the drought evaporated it. From others the wa
been allowed to communicate with that of the bay, by means of small ditch
done to prevent the fish from dying in the stagnant pool. The most impo
these ravines and gulches are shown in the sketch which I inclose. This ske
made from notes taken during inspection, and, while not mathematically
gives a better idea of the topography of the place than any map I was able
The blocks marked in red are those on which storehouses are built. There ar
220 houses, including dwellings and stores; three or four hotels and boarding
The area of the city is about 200 acres. Drinking-water is generally deriv


INDIA

rns. Some of the lower classes have been driven by the drought to use well-r for all purposes, and the better classes have been of late using it for cooking. cisterns are generally above ground; a few are under ground. The wells are a few feet deep, dug in the shell and sand. The water has a decidedly saline . None of the wells are near privies. Privies usually have no sinks nor vaults. n they have, the depth is about 2 feet. Some of them have tubs, or other wooden l, substituted for earth closets. The mayor says he requires the marshal to make ment inspections. If complaint is made through the marshal, the nuisance is d; but there is no regular cleaning of the privies or premises.

ere is one private market, kept in good condition as far as I can judge from nt appearances. It is open from 4 to 10 a. m. There are no vegetable nor fish s in the town. Two beeves a day are killed at the slaughter-house, 2 miles north wn.

nes, in large quantities, are shipped through Indianola from the interior. They nloaded from the cars at the lower end of the town, near Powder-Horn Bayou. ing particularly unsanitary could be discovered in connection with this enter-. The mayor says he keeps close watch to see that only dry, clean bones are ght in. On two occasions he has sent back a mass of them that did not come up s requirements.

y hides are received by two firms, and kept for a longer or shorter time in ware-es. These houses are kept in good order, but the inevitable odor of the hides is e.

ne of the cemeteries is 1½ miles and another 2½ miles from the town. The char-r of the soil is about the same there as in the city. Decay of bodies, as shown by mmation, is very rapid, except in one or two instances, where they were buried "yellowish, salty clay," when they have been known to be preserved for about years.

he vital statistics weekly sent by the mayor to the National Board of Health are le out from rumor and memory. Under existing circumstances, this is reliable. population is small. There is but one physician here. He informs me there is y little sickness. Deaths are very rare, only eight during the past year; so that n one of the inhabitants dies it is not likely to be overlooked. The sexton informs that during one year there were thirty-three deaths amongst infants less than two nths old, from a kind of lockjaw (trismus nascentium?). Of the eight deaths ing the past year, two were under five years old; one, six years old, from diph-ria (?). The others were people of fifty years and over. The last death was from emic poisoning in a case of progressive paralysis.

mmediate and constant attention should be given by the local authorities to clean-; regularly the streets, alleys, premises, and privies. Less than $100 per month uld cover all the expenses incurred by the public. The remainder should be done citizens, occupants of the property. Earth closets should be substituted for privy ults. The question of permanently improving the sanitary condition of the town a more complicated one. One plan is to continue the system recommended for porary adoption until every citizen forms the habit of attention to sanitary laws; trusting to the cyclones and overflows to supply any deficiency in the cleansing cess. The other plan contemplates removal from the present site to one with re natural sanitary advantages. The only importance the place has is as a ship-g point. Pass Caballo is one of the best entrances in the Texas coast, and In-nola is connected with the interior by 60 or 70 miles of railroad. The surrounding ntry, for 12 miles inland, is a low, flat prairie. Then there is quite a sudden rise about 15 feet. There is, I am told, not a farm in the county. All is devoted to ck-raising. The retail trade of the town amounts to very little.

he principal difficulty in the way of its removal is inducing the railroad company run its road to another part of the shore, and the owners of the wharf to move their ding there. Old Indianola, the former site, is higher up the bay shore. The people ved to follow the terminus of the railroad and the ship-landing. They would do again. The same parties own the railroad, the principal line of steamers (Mor-'s), and the land along the shore as far down as Alligator Head. If a proper rep-entation were made to them that the move would be in the interest of commerce and lth, I believe it would meet with their approbation. I talked with a few of the ding citizens. They approve the object, but doubt the feasibility of carrying it . The whole of the real estate of Indianola is not worth more than $100,000, not luding the court-house. To make permanent improvements at the present site uld require work (such as breakwater, grading streets, and draining the marsh ds) that would cost nearly if not quite the value of all the property in the place. to the best point for a future site, I cannot give an opinion further than to say t either above or below the present site would be far preferable to this one.

he fact that Indianola is an important shipping point, in direct communication h the West Indies; that her railroad already communicates with a thickly-popu-ed portion of the interior; that it is only a question of time when she will be closely

I have the honor to remain, very respectfully,
JEROME COCHRAN
National Sanita

DR. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

I desire to add a few words to what I have already said in relation to
ment of a quarantine hospital at Key West. It is certain that such a
always remain empty for the larger portion of every year, and that in
years, and sometimes for several years together, there would be no pati
it. This being granted, it becomes a question whether it is expedient
hospital at this place at all.

The considerations that have influenced me to recommend the hospita

1st. It will be occasionally needed, and when it is needed at all it w
badly.

2d. It might also be made a lazaretto for the reception of patients fr
itself, as well as for patients from the shipping.

3d. Key West is now, and must continue to be, an important comme
naval station.

4th. It is very near to Havana, is one of the gateways into our count
miles distant from the nearest port provided with a quarantine hospital,
Keys, rather too far to send cases occurring at Key West.

Of course it would be quite possible to provide hospital accommodation
in the harbor, at a point very near to that that I have indicated for the
hospital building, of a dismantled ship. On account of the liability of
sistent infection, I have hesitated to recommend this plan. This is a po
which the National Board can judge of for itself.

I learned at Nashville from Dr. Elliott that he had recommended a sta
some three miles from the wharves of the city. I discussed the claims
with several persons at Key West, particularly with Captain Cosgrove,
edge of the waters in that vicinity is unrivaled, and the conclusion rea
it would always be a dangerous place in storms.

Very truly,

STATE BOARD OF H
Cedar Keys, J

SIR: Yours of the 11th, requesting weekly reports, came into my hand
terday, having been sent to Key West and then back to this place. You
tion the character of the reports desired, but I suppose, naturally, t

his son, sixteen years old. Mr. Decraw's salary as quarantine guard is $15 a month. e is also pilot at this entrance, and receives $10 for every vessel that enters the outh of the river. There has been no commerce between these three points and exican or other foreign ports. Only coasting vessels have entered. They would ecome very important points for quarantine, if yellow fever should appear on the ouisiana or Texas coast. There is also the contingency, remote, but possible, of mall vessels from Mexican or other ports being turned away by the quarantine at alveston, Indianola, &c., and trying to land at some of these unguarded entrances.

To-day I have called attention of State health officer to the condition of affairs, as bove detailed.

In the meantime I requested the collector of customs of this district to instruct his spectors to co-operate with the local authorities, and to act as quarantine guards the absence of local quarantine guards, until the matter could be attended to by e State health officer. There is no quarantine establishment at any of these points. hen a suspected vessel arrives, she is sent to quarantine at Galveston or Indianola.

The entire expense of quarantine at these three points can be made efficient for $150 er month, being $50 for each place. I am informed the county negotiated with Dr. urner for $300, he to pay all expenses; Dr. Jager told me this.

Since there are no quarantine quarters at any of them, and vessels are not placed quarantine here, but are sent elsewhere, there is no need of a physician.

The sanitary condition at the mouth of Brazos is good and no special work is needed n this point. The few houses are scattered over a considerable area.

There have been heavy rains throughout this inspection district. My latest advices re that the general health is good.

My last report was dated August 13, and was mailed on the 14th.

I leave for Indianola by ship this evening; thence I go to Corpus Christi. If conistent with the law, I would be pleased to receive about thirty envelopes and wrapers, with the stamp and "frank" of the National Board of Health. Please mail me he "Bulletin" regularly. Would also like to have it sent to C. W. Short, mayor of ndianola, Dr. T. S. Burke, H. O., Corpus Christi, and Thomas Carson, and Dr. C. B. ombe, Brownsville, Tex.

I have requested the secretary of state to forward you the governor's quarantine roclamations up to date, as well as any that may be issued in future.

I have the honor to be, very respectfully, yours,

JNO. H. POPE,
Sanitary Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

INDIANOLA, TEX., *August* 27, 1879.

SIR: I beg leave to submit the following report of inspection of this district for the ast week:

There have been no changes in quarantine affairs at Corpus Christi (Shell Bank) xcept that, since the governor's proclamation construing the law as to payment of xpenses at quarantine station, the quarantine officer at that point makes out his ccount against the State for money paid for boat and boatman, and for provisions nd rent of the station. It will be remembered that heretofore Dr. Burke, the quarntine physician, has borne these expenses out of his salary of $10 per day.

The sanitary authorities at Corpus Christi have gone to work with some energy, nd the city, especially as to artificial drainage, is much improved since my former isit. It will not be necessary to "turn up" any considerable amount of dirt in draing. I expressed apprehension of the effect on health from ditching at this season, ut the city physician said he felt no anxiety on that score, as it had been done before ithout evil result.

The late heavy rains have filled the cisterns and the use of well-water is abandoned. The Mexicans use water from the "tanks" described in a previous report.

The sanitary fund at the beginning of the year, April 1, amounted to $700. This is early exhausted. A definite statement as required under Schedule U, sanitary urvey, is being prepared by the officials and will be forwarded to you as soon as eceived.

I visited Matagorda on the 25th instant. This is a town of about 600 inhabitants, hiefly whites—possibly 100 negroes. It is the county seat of Matagorda County, ituated on the west shore of Matagorda Bay, about 20 miles from its head, and bout 46 miles northeast from Indianola. The shore line here runs northeast and outhwest. The Colorado River empties most of its waters into the bay through bayou about a half mile below the town. There is a considerable quantity f low, swampy land adjacent to this bayou and extending around to the west and

All vessels are now towed in near to this guard station, the monitor, to be whether sent to quarantine or not. The quarantine anchorage is now in Santa Sound, between the monitor and the hospital, in the route of all the small trading passing through the sound.

The hospital buildings consist of an old government house, containing four rooms, which was built many years ago for the keeper of Live Oak, and is now as the residence for the quarantine physician and his boatmen, cook, and nurses. little shanty of two small rooms, located near this old house, is the hospital It is capable of accommodating but six patients comfortably. No accommodation provided for persons sick with other diseases than may be at the time in this and all cases of whatever kind from suspected vessels are placed in this together. This quarantine is conducted under the laws of the State of Florida carried on by the local officials. The fees are regulated by the State, and collected the city. All the revenue arising from quarantine fees is devoted to the mainte of the quarantine.

The fees are as follows:

Boarding and inspection	$
Discharging ballast, per ton	
Fumigation, per ton	

All ballast is required to be discharged under water, and the discharge of ballast quarantine has been let by contract and results in a profit to the city of 10 per on gross charges. The fumigation is included in the same contract, no profits ing to the city.

The total revenue derived from these sources amounts to about $2,800 at the rates of charges. Heretofore the quarantine has been carried on by the quarantine fees supplemented by private subscription, but the boarding fee has $20 for each vessel until this year, when it was reduced to $5 by State enactment.

It is universally conceded here that the quarantine of past years has been ins cient for the purposes of protection. Communication with the city by the steved by the hospital patients through their friends, and by deserters from the quaran station, has been an invariable thing in past years, according to report, and insta of clandestine visits to and from quarantine are reported to have occurred this but after most careful investigation I was not able to find any such cases. It is however, that many of the people at Pensacola have no fear whatever of yellow and have but little respect for any local quarantine regulations. So wherever have "business" with friends in quarantine, they do not hesitate to communica and the authorities have not been able to prevent it in the past, but under the management, with such changes in the service as are hereafter suggested, there be no doubt of the efficiency of the quarantine at this port.

The "wants" at this port may be stated in a single word—*money*. Without money quarantine cannot be maintained for many weeks longer, and its present conditi activity is due to the expectation of funds soon to come from the National Board Health.

The hospital is without beds or furniture, and supplies have been purchased on individual credit of the board of health.

The officers and men are without pay, and the city of Pensacola is absolutely pow less to furnish a dollar.

I have carefully gone over the items which cover the immediate wants of the to pay its liabilities and to purchase the necessary supplies and fixtures, and the amount to be $3,011. (See Exhibit A, appended.)

For the support of the quarantine until November 1, I have gone over and consider all the estimates in detail, and they have undergone various changes by the additi of amounts in some departments and deduction in others. The total amounts quired by the board to carry out the plan of conducting the quarantine here for the year, as shown by appended estimate marked Exhibit B, is $9,025. Of this sum, is needed at once, which is set forth by the appended requisition marked Exhibit

From the total estimate (Exhibit B) may be deducted $350, the actual cost of building for the boarding officer, who will be located on Santa Rosa Island, provid one of the unoccupied houses at Fort Pickens can be procured for that purpose, the Pensacola board of health will make application to the War Department, throu the National Board of Health, for the use of this building at an early day.

I append a letter addressed to me upon the subject of this station, by Dr. Hen Stewart, U. S. N., of the Pensacola navy-yard, who recommended the use of Fort Pi ens as a boarding station.

All these estimates are made with a view of establishing a boarding station at upon Santa Rosa, as near to Fort Pickens as possible. The boarding officer to be physician, and to have a salary of $150 per month. There are to be two boatmen a cook.

f 1875. The depth of water on the inside, where it is shallowest, is said to be etween 2 and 3 feet. It is very improbable that any but vessels of light draught ould enter; but, as these have made the trip from Galveston, it demonstrate the mportance of watching this entrance. The importance would increase necessarily hould yellow fever become epidemic on the Gulf coast west of Mississippi River. Doubtless a guard could be procured for the place, at $50 per month. The nearest house s 3 or 4 miles from the pass, as I am informed. This would be near enough for a "look-out" during the day, and it is hardly possible for a vessel to come through at night.

From Matagorda I visited the quarantine station at Decraw's Point. Dr. McCauley s in charge of *this*. He has two boatmen and two boats, a yawl and a sailing yacht. Dr. McCauley is paid $10 a day. The principal boatman gets $75 a month, and he ires his own help. The boats belong to the boatmen, and are furnished free. The upplies (provisions, &c.) cost about $15 a month. The household and kitchen furniture is the private property of those in charge of the station. The place is very much exposed during storms, and it is some distance to the sand-hills, which offer the best protection. It is very desirable that a permanent station should be built at Alligator Head as soon as possible.

No infected vessels have applied for permission to enter. There has been but one apparent attempt to evade the quarantine. The schooner Reliable, bound for Corpus Christi, crossed the bar at sundown; passed abreast of the quarantine station at dark, was hailed and finally shot at with a shot gun. She hauled to, and was boarded by Dr. McCauley, who found her papers and condition all right. The master claimed he did not see the flag, though it could be easily seen several miles before he reached the bar. He was allowed to proceed.

This report is accompanied by a tabulated statement of the traffic between this place and Havana during the quarantine season, which is the only time that cattle are in condition to ship. A statement from the collector of customs, Indianola, shows that this embraces all the entries from foreign ports during that time, except one schooner from Tuxpan, Mexico, with crew of four, thirty-five tons burden; cargo of fruit, mahogany, and chicte; entered April, 1879. The statement is marked A.

I also send another tabulated statement, marked B, of entries of coastwise vessels during the quarantine season. Of the 307 entries, nearly all are from ports between this and Florida. In a note the deputy collector informs me there are many sail vessels carrying lumber, &c., from Pascagoula, Calcasieu, &c., not required to enter or clear, and of which no record is kept. They are not included in the 307.

Little or nothing has been done at Indianola towards improving its sanitary condition since my last report on the subject. The heavy rains have left water standing in many of the gulches washed by the storm. This is the principal change that I note since my last visit. Some of these places are in dangerous proximity to inhabited houses, and are rendered worse by hogs (allowed to run at will) wallowing in them. Some of the gulches are in such position that they cannot be ditched; the only remedy then is to fill them up with shell and sand from the beach. This would cost about $700 for filling places near dwellings. Several of these are on lots, and not in the streets. I asked the mayor why he did not fill them and charge to owner of the property. He said he had threatened some with this, and they replied he could take the property if he wanted it. They are vacant lots.

As before reported, no city taxes are collected. The city owes a debt of between five hundred and a thousand dollars, in the shape of scrip. Hence there is no appropriation for sanitary purposes; no money to pay any one to attend to keeping the city in good condition. No plan for even temporarily improving the condition would be successful without providing for a paid health inspector. One could be had for about $100 a month.

After the city is placed in condition that $700 would place it, it could be kept so for about $85 per month, exclusive of the inspector's pay. The $85 would be used for garbage carts, cleaning streets, and hauling off excrement from privies. The mayor informs me that he can raise by private contribution about $65 a month.

During the year ending July 31, 1879, the total municipal expenses were $54, which was paid the recorder for extra work done by him. The amount was raised by fines, that were paid in cash and not in scrip, and the deficiency was paid by private subscription.

Individuals contributed $55 for repairing a street during the past year. I have advised the mayor to open communication with your board with the view of obtaining assistance.

August 28.—I had intended leaving for Brownsville to-day, but the only ship on that trade has just arrived from Galveston and will turn back without going to Brazos Santiago, because Galveston quarantined against Brazos Santiago and Brownsville on the 26th instant. It seems that the S. S. Ariel, from Liverpool, via Vera Cruz and Tampico, and which is the one alluded to in my report of August 2, was put in quarantine on arrival at Brazos Santiago. At the end of ten days, according to the best of my information, the quarantine physician took the responsibility of releasing the

Report of the business of the port of Pensacola from July 1, 1876, to June 30, 187

ARRIVALS.

Classification.	Number of vessels.	Tons.
Foreign vessels	270	194,801
American vessels from foreign ports	110	34,560
Coastwise	210	49,208
	590	278,569

CLEARANCES.

Classification.	Number of vessels.	Tons.
Foreign vessels	278	200,455
American vessels from foreign ports	84	26,153
Coastwise	225	50,116
	587	276,724

Import duties	$7,049 49	Exports, foreign	$1,861,
Tonnage dues	44,116 11	Exports, coastwise	415,
Hospital money	2,342 94	Timber, cubic feet	9,375,
Hospital disbursements	5,980 40	Lumber, square feet	67,787,

Comparative statement.—Shipping entered at following ports during year ending June 1876.

	United States.	Foreign
Pensacola	106	324
Savannah	56	269
Mobile	72	77
Galveston	60	125
Key West*	295	73

*Including the many fishing smacks arriving from Havana.

PENSACOLA, FLA., *June* 20, 1879

DEAR SIR: I left this port yesterday on the revenue cutter Seward for Sai
Andrew's. Last night when about 60 miles out we encountered an east wind, again
which the vessel proved powerless to make headway, and we were forced to return
this port to-day.

There is now no means of reaching Saint Andrew's from here other than by a char
smack, and they run but rarely. I am informed by the collector of customs he
that a contract has been made at that place for shipping one thousand cattle
Havana or other Cuban ports, and that the two vessels carrying these cattle are th
only ones reported as clearing from there this season, and he thinks the probabilit
are that the last cargoes have already left, or are now being loaded.

The report of four vessels taking cargoes of "coal" from Saint Andrew's, whi
appears in New Orleans Times of the 19th, should read "cattle" instead of coal, a
"two" instead of four.

There is probably more danger of yellow fever being introduced at these sma
ports along the Florida coast as the season advances, and they should be carefu
watched.

I was so much disabled by the gale last night that I have not reported by telegra
for orders to proceed to-day, and I have a little further Pensacola work that I oug
to do.

I am, yours, very respectfully,

E. M. WIGHT,
Inspector Quarantine

DR. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

and all clothing aboard to be purified; and shall cause such vessel to be fumigated, when so required by the health officer.

ART. 7. The health officer, if he shall deem it necessary in order to prevent contagion, may cause any bedding or clothing on board a vessel subject to quarantine, or any portion of her cargo that he may deem infected, to be destroyed.

ART. 8. Any master of a vessel, or person in charge thereof, who shall land any person from his vessel, or unload or transfer any portion of his cargo before his vessel shall have been visited by the health officer, or who shall afterward land any person or unload any portion of the cargo therefrom without permission of the health officer, shall be fined for each offense in a sum not exceeding one hundred dollars.

ART. 9. Every person who shall willingly or knowingly oppose or obstruct the health officer in performing the duties required of him in this ordinance, shall be fined in a sum not to exceed one hundred dollars for each offense.

ART. 10. Any pilot who shall bring a vessel from any port or place in the United States to the city of Indianola without complying with the provisions of this ordinance, shall be fined not more than one hundred dollars.

ART. 11. That it shall be the duty of the quarantine officer to keep himself advised of the existence of any pestilential or contagious diseases at ports from which vessels may arrive at, or be about to sail from, Indianola, and to require any such vessel which may arrive to stop at the quarantine station. And any master of a vessel violating the order of the quarantine officer shall be fined not less than one hundred dollars, nor more than three hundred dollars, or by imprisonment for three months, or both.

ART. 12. That the pilots of this port shall notify all vessels coming from ports declared to be infected of the existence of the order, and shall bring such vessel to anchor outside the bar or at the quarantine station for examination by the health officer. And any pilot who shall take any such vessel beyond the quarantine station, without a permit from the health officer, and any violation of any provision of this ordinance by any pilot, shall subject him to a fine of not more than one hundred dollars.

ART. 13. The master or person in charge of any boat, steamboat, or other vessel who shall come past the quarantine station, having on board thereof any person sick with malignant fever, small-pox, or other pestilential or infectious disease, shall be fined not less than one hundred nor more than five hundred dollars.

ART. 14. The owner, driver, conductor, or person in charge of any stage, car, or public conveyance, which shall enter the city having on board any person sick of malignant fever, small-pox, or other pestilential or infectious disease, unless such person became sick on the way and could not be left, shall be punished by a fine not to exceed five hundred dollars. And if any person, so sick, shall be brought into the city by any public conveyance, the person in charge thereof shall, within one hour, report the facts, with the name of the person and the house where he was put down in the city, to the mayor. And any person failing to comply with this provision shall be punished by a fine not to exceed one hundred dollars.

ART. 15. Any person, other than those named in the preceding article, who shall bring, or cause to be brought, into the city any person tainted or infected with malignant fever, small-pox, or other pestilential or infectious disease, shall be punished by a fine of one hundred dollars.

ART. 16. The mayor or health physician shall have power, by an order in writing, to be served on the person in charge of any vessel that may be suspected by either of the said officials to have on board any infected or diseased persons or property, to require said vessel to be removed to some place not less than two miles from this city, and every master or person in charge of such vessel who shall fail to remove the same, after being so notified, within five hours from service of the notice, shall be punished by a fine, not less than fifty nor more than one hundred dollars, for each day he shall fail to obey said order; and each day's violation of said order shall be a separate offense.

ART. 17. Every keeper of an inn, hotel, tavern, or boarding house, who shall have in his house, at any time, any sick guest or other person shall report the facts and name of the person, in writing, to the mayor or health officer within six hours after the arrival of said person, or after the time he was taken sick therein. And any neglect to comply with this requirement shall subject the keeper of such house to a fine of not less than five nor more than twenty-five dollars.

ART. 18. Each physician shall report to the mayor the name, residence, and disease of any patient whom he shall have sick of any malignant fever, small-pox, or other pestilential or contagious disease, within six hours after he shall have ascertained the nature of the disease. And any neglect to comply with this requirement shall subject the offender to a fine of not less than ten nor more than fifty dollars.

ART. 19. The mayor or health physician, when informed of the existence of any malignant fever, small-pox, or other infectious or contagious disease in this city, shall cause the person affected to be removed from the city limits, to be taken to such place vessels, established by the Louisiana State board of health, 4 miles below th at the mouth of Wax Bayou, on the Atchafalaya River. It is situated on la consists of a small house, a mere shanty, on which the authorities have no clai mere squatters. The quarantine officer, Dr. W. H Carson, is intelligent and se be energetic. He, however, resides at Morgan City, 4 miles above the statio is allowed, so he informs me, two assistants, but employs only one, who rem the station to hail the vessels, and then goes up to Morgan City to report the to the quarantine officer. This seems to me to be a lax manner of conducting antine; for while he is absent no one remains at the station to prevent perso are detained there from going where they may choose. At this time there sailors from a vessel in Havana trade, who are in apparent good health, detained

I have suggested to Dr. Carson to employ the other assistant allowed him b Louisiana State board of health, so that some one in authority will at all time the station. Really it occurs to me that the quarantine officer should reside which he would do, if he had suitable quarters. Dr. Bemiss, of the National informed me that he has asked for a hulk to be used at the station. It occurs that it would also be well to erect a cheap building on the land for the quar the officer, which could also be used for the accommodation of passengers. Th could be used as quarters for the assistants, and as a hospital. To erect a building would require about $1,000. A piece of land would also have to be lea purchased. What the cost of this would be I cannot say; but Dr. Carson has ised to ascertain and inform me.

There is another point connected with the conduct of this quarantine to wh would invite your attention. The ships of the Morgan Line, plying between this and Galveston, Indianola, and Brazos Santiago, are permitted to enter without even inspected. I do not know that they usually have any communication with other vessels on their voyage in fact, I believe; they do not, but such a thing be possible; and it seems to me it would be well if they were inspected.

I heard of no leprosy (*Elephantiasis*) in the vicinity of Morgan City.

I was not able to procure a copy of the rules governing the quarantine at M City, as the officer did not have a copy, but they are the same as those in force at stations in Louisiana.

I am now on my way to Galveston, and will mail this from there, as I did no time to write it at Morgan City.

Have not yet received the rules of the National Board relating to quarantine. C tinue to address me in care of Dr. S. M. Bemiss, New Orleans.

Very truly, yours,

WIRT JOHNSTON,
Sanitary Inspe

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

GALVESTON, TEX., *July* 8, 18

DEAR SIR: In my report of Morgan City it would perhaps have been proper to h mentioned, in connection with the statement that the ships of the Morgan Line ing to Galveston and Indianola are not inspected, that Mr. Hutchinson, manage the line, is a member of the Louisiana State board of health, and, it may be, has g that board some assurance that the vessels will not be permitted to communicate vessels from infected ports. But it does seem to me they should be inspected, a captains, without his knowledge, might have such communication. It mus remembered that the same company have ships running between Indianola Havana, and it would be an easy matter, it strikes me, for the crews of the ships ning between Morgan City and Indianola to intermingle with those from Havana.

Very respectfully, yours,

WIRT JOHNSTON,
Sanitary Inspect

Dr. J. T. TURNER,
Secretary National Board of Health, Washington, D. C.

ORANGE, TEX., *July* 9, 18

DEAR SIR: I have the honor to submit the following report of the city of Galve

The quarantine station is located on shore, on piles driven in the sand, 2 from the city, at the entrance to Galveston Bay, and consists of a small wooden h with two rooms, and is occupied by the quarantine officer and family as a reside The nearest inhabited dwellings are about half a mile distant. It has no hosp

ART. 2. If any person owning or using a privy, or necessary house, shall keep and use the same in such a way as to make it offensive to the public, or to any person living in the vicinity, he shall be subject to a fine of not less than five dollars for each offense. And each day he shall keep and use the same in such way, after being notified by the marshal, shall constitute a separate offense.

ART. 3. It shall be unlawful to remove the contents of any vault, privy, or necessary house, in this city, at any time between the 1st day of July and the 1st day of October, in any year, except with the permission of the mayor, and in accordance with such directions as may be prescribed by the common council. And it shall be unlawful to remove the same at any other time of the year except between the hours of ten o'clock at night and four o'clock in the morning. And any person offending against either of the provisions of this section shall, upon conviction, be fined in a sum not exceeding ten dollars for each offense.

ART. 4. It shall be unlawful for any person to throw, place, leave, or deposit, or permit his or her servant, or any other person of his or her family, to throw, place, leave, or deposit, the carcass of any animal, or any carrion, putrid meat, fish, entrails, or other un wholesome substance, in any square, street, or alley, or upon any lot within the city, or upon any ground within the limits thereof, except upon such ground or place as shall from time to time be designated by the mayor for such purpose. And for every violation of this section the offender shall be subject, upon conviction, to a fine of not more than five dollars for each offense.

ART. 5. It shall be unlawful for any owner or occupant of any store, house, stable, or other tenement, or of any lot, yard, or inclosure in this city, to permit any of the substances or things mentioned in the last preceding section to be or remain in or upon said house, store, stable, or other tenement, or lot, or inclosure, or between the same and the center of the street adjoining, under a penalty of not more than five dollars for each day the same shall remain thereon.

ART. 6. Every owner or keeper of any animal which may die within the limits of the city shall forthwith remove, or cause to be removed, the carcass of the same, to the place designated by the mayor for such purpose. And for refusal or failure to comply with the provisions of this section, each owner or keeper shall be subject to a fine of not less than five dollars.

ART. 7. And any person who shall throw or discharge from his house, factory, or lot, into any street, avenue, or alley, in this city, any noisome or offensive liquid or substance prejudicial to the health of persons residing in the neighborhood of, or offensive to persons passing by, said house, lot, or factory; and any person keeping on premises occupied by him any animal or vegetable matter that is generally offensive to persons residing in the neighborhood, or deemed prejudicial to their health, shall, for each offense, be subject, on conviction, to a penalty not exceeding five dollars.

ART. 8. The mayor of the city is hereby authorized to prohibit and prevent the introduction into the city of any infected article, which, in the judgment of the physician appointed to examine the same, may endanger the health of the city. And any person or persons willfully or knowingly introducing into the city any such infected article contrary to the prohibition aforesaid shall be subject to a penalty of not less than five dollars nor more than twenty-five dollars for each offense.

ART. 9. It shall not be lawful for any person to skin any dead animal that may die within the limits of the corporation, or that may drift on the shore, without immediately burying, or in some other way destroying and removing the carcass to the place designated by the mayor for such purpose. And any person violating the provisions of this article shall be fined in a sum not less than ten dollars nor more than twenty-five dollars.

Approved May 9, 1873.

SAM. M. JOHNSON, *Mayor.*

Attest:
STEPHEN MINOT, *City Recorder.*

INDIANOLA, TEX., *September* 5, 1879.

SIR: Since my last report I have visited the quarantine stations and other points between this and Corpus Christi.

The officials (mayor and board of aldermen) of Corpus Christi have furnished me the following, in reply to questions in Schedule U, sanitary survey.

(1) The total amount of money appropriated by the city for sanitary purposes for year ending April 1, 1879, $1,044.

(2) Amount expended for each of the following items: (1) deep drainage; (2) sewerage; (3) paving; (4) repair of streets; (5) street cleaning; (6) removal of ashes and garbage; total, $632.60. (They stated that they had no means of ascertaining the amount paid for each item.) (7) scavengering, $68.50; (8) construction and

NEW ORLEANS, LA.,

DEAR SIR: I have the honor to submit the following report of Cal
and neighborhood:

On Calcasieu Pass, two miles from the little village of Leesburg
office) and a half a mile from the Gulf of Mexico, is a quarantine
established by the board of health of Cameron Parish, and is under t
is located on shore, and consists of a small wooden house, owned by
officer, who is also the keeper of a private light-house, and is not a
nearest inhabited dwelling is about a half a mile distant. There are
tions for either sick or well.

The quarantine is against all contagious or infectious diseases, and
against "all Mexican, Central and South American ports"; and if
with a clean bill of health, she is subject to the same detention (tw
she had none.

Arrivals from any port where a contagious or infectious disease is
be subject to quarantine.

No record has been kept of the vessels that have been put in quar
other arrivals; therefore I am unable to furnish it.

When a vessel arrives from a suspected port, or in a sickly conditio
subject to quarantine, no inspection is made of her state as regar
ventilation. No measures are employed to improve her sanitary c
record is kept of any vessel.

When a vessel leaves the port, no strict examination is made of he
if there is no sickness on board a certificate to that effect is given t
the board of health.

There has been no violation of the quarantine rules; and should a
quarantine pass the station without a permit, a fine of $250 would
she sent back to the quarantine station.

No disease, for which quarantine is liable to be imposed, has occu
inhabitants of the place. There was an epidemic of yellow fever at t
Charles, which is 60 miles above the Pass, in 1867; but was introd
Orleans.

Quarantine measures by land were instituted last year throughout
country, and it escaped the yellow fever.

No fees are charged for any service in connection with the quaranti

The aid of the National Government has not been invoked.

The general sanitary condition of the country is now good.

Leesburg, the seat of government of the parish of Cameron, is a ver
and the country above it, on Calcasieu Lake side, is principally a m
sparsely settled. When Calcasieu River is reached the inhabitant

through Saluria Bayou she entered Espiritu Santo Bay, whence it was easy to get to Rockport without examination at quarantine.

The latest official information I have concerning the quarantine of Brownsville, by Galveston, is a telegram from Dr. Rutherford, on 30th August, saying he had been ordered to investigate the cause and would leave by the first steamer for Brazos Santiago. The steamer is here to-day, and as Dr. Rutherford did not come, I hope Galveston has felt justified in raising the quarantine, though I do not know that such is the case.

I leave for Brownsville by this steamer.

Very respectfully,

JNO. H. POPE,
Sanitary Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

ROCKPORT, TEX., *August* 9, 1879.

Having examined, by request of Dr. John H. Pope, the bulletin issued by the National Board of Health, under the authority granted by an act of Congress approved March 3, 1879, to prevent the introduction of infectious and contagious diseases into the United States, and to establish a National Board of Health, as far as my limited judgment and experience extends, I heartily approve and indorse the rules and regulations adopted by said board for the prevention of the introduction of disease.

E. A. PERRENOT, *Mayor.*

CORPUS CHRISTI, TEXAS.

Be it ordered by the city council of the city of Corpus Christi, That the office of city janitor is hereby created, and that some suitable and competent person may be elected at once to fill the position by the city council, and hereafter every year by the council in the month of April, or as soon thereafter as possible; and the incumbent shall hold his position till his successor is elected, or the office is abolished, or he is discharged by the council.

SEC. 2. It shall be his duty to ring the bell in the market hall at the hours of 7 a. m., 12 m., 1 p. m., and 6 p. m. He shall see that the city market is kept clean and in good condition. He shall inspect all meat, fowls, fish, fruits, vegetables, or any eatables that may be exposed for sale in the city market, and shall have power and be required to cause to be removed any tainted, decayed, or unwholesome meat, fowls, fish, fruit, vegetables, or any other eatables, at the cost and expense of the person or persons who expose them for sale. In all that relates to the care and policeing of the city market, he shall have the same power and authority as a policeman. He shall be the custodian of all tools or implements of every description belonging to the city, and shall make a full and complete list of them. He shall keep them in good order and repair, and, when taken for use by any city officer, shall see that they are duly returned. He shall keep the city council room, furniture, lamps, &c., clean and in good conditoin, and, at every regular or called meeting of the city council, shall have the lamps lighted and, if necessary, the fire built in the stove; and perform, generally, such services as the city council may require. His compensation shall be $30 per month, to be paid by warrants drawn upon the city treasurer, in like manner with other officers of the city. All ordinances and parts of ordinances conflicting with the foregoing ordinance are hereby repealed; and this ordinance to take effect and be in force from and after the first day of May, A. D. 1878.

Approved.

Section 6 of an ordinance regarding nuisances, 19th day of May, A. D. 1875.

That it shall not be lawful for any owner or keeper of a market, fish, vegetable fruit, or meat stall, or vender of such articles, to throw, place, leave, or deposit waste pieces of meat, bones, fish, entrails, vegetables, filth, or unwholesome or unsightly substances of any kind on the market square, or any square, street, lot, or upon any other ground within the city limits; and for every violation of this section the offender shall be subject, on conviction, to a fine of not more than ten dollars for each and every offense.

I certify that the above is a true and correct copy.

JAMES F. McCLEAN,
City Secretary.

BROWNSVILLE, TEX., *September* 13, 1

DEAR SIR: I have the honor to submit the following report concerning Browns Texas:

The city is in latitude 25° 53′, longitude 24° 24′ 30″, on the east bank of the Rio Gra River, about 30 miles above its mouth, and nearly opposite to Matamoros, Mexic was founded in 1848 and incorporated in 1851; the population in 1860 was 2,674 wh and 60 negroes; in 1870 it was 4,827 whites and 78 negroes; the present popula estimated to be 6,500, exclusive of the United States troops at Fort Brown. It is timated that there are about 75 Spaniards, 40 Irish, and 100 American residents b elsewhere than in this vicinity. There are about 100 negroes and mulattoes.

The site of the city is level, surrounded toward the north and northwest by low prairie, and on the west and south by the Rio Grande River. The surface soil is a porous, sandy alluvial, in which vegetation thrives during the season of rains. Pass though this we come to a darker stratum at a depth of 5 to 10 feet, which has cons erable mixture of clay, and is strongly impregnated with salt. The next laye said to be a kind of quicksand, and the next a hard clay ("hardpan"). This h clay is at a depth of 30 to 35 feet below the surface, according to the best informati I am able to obtain in the absence of geological record.

The surface soil is said to dry very rapidly, but as it has rained almost constan since my arrival here I am not able to judge from observation.

The map which I send by this or next mail will give a pretty correct idea of th lines of drainage and the fall. This is liable to some error on account of chok gutters and some filling done since the survey was made from which this map w compiled. On account of the looseness of the soil the gutters easily fill. There a many ponds that cannot readily dry, some of them more than 2 feet deep, and of extending up to the very doors of the houses in the Mexican settlements (marked the map).

The portion of the city from the ice-house, or above, and extending in a more less circuitous route to the custom-house and post-office, and so on in this gene direction to the outskirts, is built on land made by natural and artificial filling up an old resaca or shallow bayou, which, in high water, was an outlet from the river. low water it was dry. This resaca can still be traced in several places east of Wa ington street, where it has been alternately filled and left in original state, thus maki ponds that hold stagnant water.

The garbage carts have not kept the surface cleaning well done; indeed, they are qui far behind with it. In some places the garbage from one portion of the city had be dumped to fill a depression or improve a crossing at another. Nearly all the priv have vaults 8 to 18 feet deep. Some few are walled with brick and cemented. The is no systematic cleaning or disinfecting of them; and, with the exception of those the premises of a few of the better class of population, the privies are reported to in a bad condition.

There are about a dozen cellars in town, mostly located on the east side of Elizab street, between Twelfth and Thirteenth. I send you rough diagram showing the lo tion and condition of each of them. It is plain that some of them need attention.

Some of the yards and premises are models of neatness; but, taking the city a whole, there is much needed to be done by the vigorous enforcement of sanita ordinances.

The work that should be promptly done consists of—

First. Making outlets from the many ponds before the water has remained in th any length of time.

Second. Filling in such depressions and basins with brickbats and sand.

Third. Opening the choked gutters to obtain full benefit of the slight natu drainage.

Fourth. Rounding off the streets where needed to make the slope from center to e side or gutter, in order to encourage drying process.

Fifth. Thoroughly cleaning the surface of the streets and alleys of all decay vegetable and animal matter.

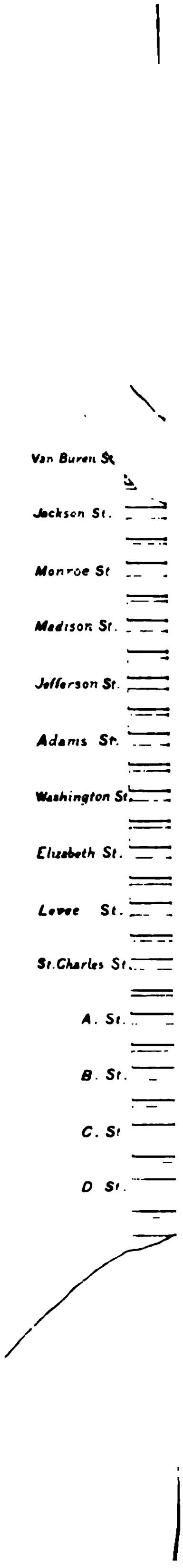
Sixth. Enforcing inspection and cleaning of premises and disinfecting when nec sary, or abating any nuisance, such as cleaning vaults, cellars, &c.

That the Board may be able to judge of the financial necessities of the city, I app a statement made up from official sources.

For year ending April 1, 1879.

Amount of taxable property in city, rendered	$749,
Amount of taxable property in city, unrendered	150,
Total taxable property in city	900,

Rate of tax for general purposes, $\frac{1}{2}$ of 1 per cent.
Rate of special tax for school purposes, $\frac{1}{3}$ of 1 per cent.



MAP OF THE
CITY OF BROWNSVILLE .

Lot's 50 X 120 ft. Block's 12 lots except between 12th and 13th Streets, which are 14 lot's — Street's 60 ft wide — Cross Street's 40 ft. wide — Alley's 20 ft wide — Open drainage — Least fall, 2 to the 100 ft. — Greatest fall, 9 to the 100 ft. — O. point Market-house-floor, 50 ft. above tide water — 16 ft. above Resaca at mouth of Ditch — 6 ft. above high water of River — 20 ft above low water of River — 11 ft. above mouth of Resaca on Bank of River — about 1 mile below the Town — Steamboat-landing — 1 foot higher than Floor of Market.

Dotted lines show obstructions in the Streets.

J - Jacales - H.Y. - Hide Yards - H - Houses

P.O. - Post Office - C. H. Custom House

Arrows show the fall — Figures at the intersection of Streets show difference of level from Market-house-floor

Dotted lines - - - - show where Streets have been changed by Jacales built in irregular lines

Dotted lines show course of the "old Resaca" now filled, for the most part.

Amount of taxes collected, about	$5,000
Amount of taxes collected on account occupations	1,080
Amount realized from rent of market	8,352
Total income of city, excluding tax on drays	14,432

There are also 52 drays which pay each a license of a dollar a month, to be paid by work on the streets.

There is no bonded debt.

The floating debt amounts to		9,232 00
From which is probably to be deducted the amount due city by State, out of school fund	$2,400 00	
Also, claims against the State for amount expended for quarantine guards, 1878	2,557 66	
		4,957 66
This balance should be the true floating debt of the city		$4,274 34

No specific appropriations were made for sanitary purposes, except as follows: $50 a month were paid for garbage carts; between twenty-five and twenty-six hundred dollars expended for quarantine guards around the city, during 1878; $20 per month were paid the city physician; $65 were paid for medicines for the poor.

The following has been expended for sanitary purposes since April 1, 1879, each month:

	Appropriated.	Expended.
Paving and repairs of streets	$50 00	$50 00
Street-cleaning, removal of ashes and garbage, and for scavengering	50 00	50 00
Total	100 00	100 00

Total to August 31, 1879, $500.

Total municipal expenses for the year ending April 1, 1879 .... 14,136 00

The following is a statement of salaries of municipal officers:

1 city marshal (chief of police) per month	75 00
1 lieutenant of police (in charge of night patrol) per month	60 00
12 night-police, or patrols, $30 each, per month	360 00
2 day-police, or patrols, $30 each, per month	60 00
1 sexton, per month	40 00
1 special cemetery-police, to prevent defacing graves, &c	30 00
1 city clerk, $500 per annum, or	41 66
1 mayor, no salary.	
8 aldermen, no salary	
City engineer, no salary.	
City attorney, no salary (at present).	
City physician (for attention to paupers)	35 00

To put the city in anything like good sanitary condition would, I think, cost at least $3,000. I have conferred with the mayor and other citizens on this subject, and the estimates made are generally higher than this. The mayor and health committee manifest a lively interest in matters pertaining to the health of the city; but, when asked as to the cause of present bad condition, have replied that they are not able to do better with the funds they have; that the means at their command do not permit of even half doing the necessary work. I have suggested that the authorities correspond with the National Board of Health, as provided in Circular No. 7. If consistent with the plans of the Board, I should be glad to have this city receive some aid. The mayor thinks if the municipal authorities were able to do more work, it would be an easy matter to induce the citizens to keep their premises in proper condition.

At my earliest leisure I will report further on some points connected with the sanitary condition of this place, but which are not of immediate importance.

Dr. Wolff has superseded Dr. Main as quarantine officer at Brazos Santiago. The Brazos wharf and warehouse are still used for fumigating freights from infected ports. The additional force has been reduced to one guard at Brazos and two mounted guards at Clarksville. The county authorities have discontinued the guards placed by them at Point Isabel and on the Rio Grande River. Dr. Combe has not returned. The latest advices are that he left Soto la Marina on the 9th instant for Matamoros, overland. The bad condition of the roads, and the fact that he brings his patient with him, will probably defer his arrival till about the 20th instant.

There have been no vessels at Bagdad since my former visit. The consul at Matamoros informs me that the Mexican sentiment is as first reported; on this subject I am glad to say the consul manifests great interest in matters of co-operation with the National Board of Health.

ever it can be, and that a certificate to that effect be given each ves

From Brownsville and vicinity I go, in company with the State Indianola, thence to Corpus Christi and other stations on the coast Galveston.

Indianola is permitted to reopen trade with infected ports, under I inclose. A quarantine guard has been placed by Dr. Rutherfor Caney or Mitchell's Bayou, near the head of Matagorda Bay, since that point.

At Galveston, which I will reach about the 22d instant, I will aw from the executive committee, as I will have finished all investigati that are deemed important under present instructions.

Very respectfully,

JNO.
Sa

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

THE STATE OF TEXAS,
City of Brownsville:

Be it remembered that at a regular session of the board of alderm city of Brownsville, Texas, held on the 16th day of September, A. D. ing ordinance was formally adopted and duly spread upon the prop city, to wit:

* * * * * *

SEC. 3. That it shall be the duty of the health physician to abate sances which in his judgment shall be injurious to public health, to r up, draining, and regulating of any lot or lots, grounds or yards, places of the city, which shall be unwholesome, or have stagnant w cause may be in such condition as to produce disease, and shall do done anything necessary in regard to cleansing and disinfecting priv filling up the same, as also to require the cleansing of any house, bu or ground, from any impure or unwholesome matter of any kind.

SEC. 4. That for the purposes hereof, and for the proper and promp powers herein conferred upon the health physician and health ins invested with all the powers of chief of police. And the health phy ized to enter houses, public and private, or other places, first aski the owners or occupants thereof.

SEC. 5. That any work necessary in the opinion of the health office any street or alley or other property of the city, the said officer will mittee on streets and landings to have the same performed; and an work which the health officer shall require of the owner or occupant discharge of his duties herein assigned and required of him, shall be deemed guilty of a misdemeanor, and shall be punished by fine not to exceed one hundred dollars, and by confinement in the city prison not to exceed ten days.

SEC. 8. That this ordinance take effect and be in force from and after its passage.

THE STATE OF TEXAS,
City of Brownsville:

I, C. F. Tilghman, city secretary of the city of Brownsville, State of Texas, and custodian of the records of said city, do hereby certify the above and foregoing to be a true copy of sections 3, 4, 5, 6, 7, and 8 of a duly authenticated ordinance, as is manifest upon the said records now in my office.

In testimony whereof I have hereunto set my hand and affixed the seal of said city at office in Brownsville, Tex., this 12th day of September, A. D. 1879.

[L. S.] CHAS. F. TILGHMAN,
City Secretary, Brownsville, Tex.

THE STATE OF TEXAS,
City of Brownsville:

Be it remembered that at a regular session of the board of aldermen in and for said city, held on the 16th day of June, A. D. 1879, the following proceeding among others was had and entered of record in the minutes of said session, to wit:

"It was moved by Alderman Neale, and duly seconded, that from and after the 1st day of July next no burial permit be issued without a certificate of the cause of death from the attending or city physician. Carried."

THE STATE OF TEXAS,
City of Brownsville:

I, C. F. Tilghman, secretary of said city, and custodian of the records thereof, hereby certify the above to be a true copy of an extract from the minutes of the common council of said city, as appears of record in my office.

Witness my hand and the seal of said city this 12th day of September, A. D. 1879.

[L. S.] CHAS. F. TILGHMAN,
City Secretary, Brownsville, Tex.

Restrictions to be placed upon vessels sailing from infected ports for Brazos Santiago.

AT SAILING PORT.

1st. The ships must be purified from bilge, as source of transmission of infection, by repeated pumping in and out of pure water.

2d. All the hold, cabins, and other internal portions of the ship must be fumigated with sulphurous or chlorine gas for a period of not less than four hours, with closed hatches and ports. And, as soon as practicable to open, be washed over with a solution of sulphate of zinc, 60 pounds to 40 gallons of pure water, with brushes, as if painting, in all the internal portions of ship, and decks and gunwales externally.

3d. The crews employed must be as far as possible acclimated men, and all the bedding, clothing, chests, &c., must be either boiled or heated by dry heat to a temperature of 250 F., or otherwise disinfected to the satisfaction of the health officer of the port from which they sail. After which they shall hold no further communication with any one ashore or the crews of other vessels in waiting.

4th. All this (the above?) is to be done under the direction of a competent medical officer, who shall give a certificate of same to master before loading of any cargo.

5th. After receiving cargo and during voyage, whenever weather will permit, the vessel must sail with open hatches and ports and have decks and portions of ship accessible daily washed over with solution of sulphate of zinc, 30 pounds to 40 gallons of pure water, and the bilge daily removed. The master is charged with the performance of any other rules of general sanitation which circumstances demand, and to bring with him the certificate, properly authenticated, of the health officer inspecting his vessel at sailing port, and receive no cargo infected, or suspected to be infected, at time of loading.

PORT OF ARRIVAL.

When ships arrive at the wharf, they must discharge their cargo into the quarantine warehouse, and the ship and crew also held until both are disenfected to the satisfaction of the health officer at Brazos St. Iago. The freight thus received must be held in warehouse sixty hours and disinfected every six hours for forty-eight hours regularly, or longer, at discretion of health officer; and twelve hours after last disin-

ART. 4090 (h). That the laws in regard to local quarantine by th
places or points shall remain and be in full force, provided, that in al
disputes between points or places contiguous or remote within the St
ences and disputes shall be immediately, by the local health authori
if none, by such authorities, county or municipal, if any there be, or
inhabitants themselves, reported and submitted to the governor; an
of which he shall forthwith order the aforesaid health officer to said
with instructions to investigate the same, and report back to the gov
condition of things; and upon due investigation and deliberation th
issue his proclamation declaring the determination of the issue, and by
tion the aforesaid disputes shall be governed.

ART. 4090 (i). Said quarantine and health officer shall give a goo
bond, in the sum of ten thousand dollars, made payable to the gov
proved by him, for the honest and impartial performance of his duti
hold his position for the space of two years, subject to removal at an
governor may be satisfied that the public good demands.

ART. 4090 (j). Whenever quarantine is declared by the governor
authorities or corporate authorities of this State, it shall be the duty
ity, within twenty-four hours of the issuance of such declaration, to e
antine station or stations where any person may be detained for such
as, in the discretion of the quarantine officers, is demanded by public

ART. 4090 (k). It shall be the duty of the quarantine officers of the S
or city authorities, as the case may be, to furnish persons detained b
antine stations with subsistence and shelter.

ART. 4090 (l). Any person detained at any quarantine station who
absent himself from such quarantine station without leave of the
charge thereof, shall be guilty of a misdemeanor, and shall be fined n
nor more than one thousand dollars, by a court of competent jurisdict

ART. 4090 (m). That all the costs and expenses of enforcing and main
eral quarantines, or such as are ordered by the governor for the Stat
out of the fund appropriated for quarantine purposes.

SEC. 2. No quarantine officer of this State shall be empowered to
ten dollars per day for such services; and all contracts made by an
county authorities for a greater amount shall be disallowed by the co

SEC. 3. All quarantine officers, whether of towns, cities, or counties
be authorized to administer oaths to any person suspected of violating
regulation; and any person swearing falsely, upon conviction thereof b
of competent jurisdiction, may be punished therefor as in other cases
vided.

SEC. 4. The near approach of the close of the session creates an im
necessity that the rule requiring this bill to be read on three severa
pended; and it is so suspended; and the near approach of the sickly
an emergency which requires this bill to take effect from and after it

this is as long as it ever requires. The quarantine buildings for Aransas Pass will be built at Shell Bank, according to the present arrangement of the State health officer.

There will be no buildings at Corpus Christi Pass. All passengers and freights will be sent from here to Shell Bank. The guard at this pass is at Healey's house, at head of Padre Island. No vessels enter here as yet, but those of small draught could do so. It is expected the channel through the bulkhead will be opened in another month.

There is not much being done toward further improving the sanitary condition of the town of Corpus Christi. This I am told by the city physician, who also informs me that the proposition to tax for sanitary purposes, alluded to on page 3 of my September 5 report, was defeated.

The State health officer submitted to the city council quarantine restrictions for admitting "vessels without cargo"; being in substance the same as those adopted by Brownsville and Indianola. After some discussion, action was deferred until the next regular meeting. It is my opinion that the quarantine at this place will not be modified unless Galveston should adopt the regulations that have been adopted at Brownsville and Indianola for admitting vessels from infected ports. The commercial relations here seem to be more intimate with Galveston than with New Orleans and Havana. This is probably due to the shallow bars that do not admit the steamers engaged in trade with the latter ports.

I inclose a map of Corpus Christi, showing its most important features from a sanitary view.

I leave by steamer this evening for Galveston, where I will mail this report. From Galveston I will visit points between there and the mouth of San Bernard, in company with Dr. Rutherford, and then return to Galveston, where my mail will reach me for the next eight days (from present date), unless my plans are modified by orders from your office.

Very respectfully,

JNO. H. POPE,
Sanitary Inspector.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

Statement of expenses at various quarantine stations from San Luis Pass to the mouth of the Rio Grande River, being the amounts contracted for by the local authorities, to be paid by the State, per month. (Data given by State health officer.)

1. Brazos Santiago and Clarksville:	
(*a*) Quarantine physician	$300
(*b*) Two mounted guards, at $75	150
(*c*) To pay boatman for boarding vessels	20
2. Corpus Christi Pass:	
(*a*) One guard	100
3. Shell Bank:	
(*a*) Quarantine physician	300
(*b*) Boatman and boat	75
4. Indianola:	
(*a*) Quarantine physician, boats, and boatman	300
5. Mitchell's Bayou, or mouth of Caney:	
(*a*) Quarantine guard	75
6. Mouth of San Bernard, mouth of Brazos, and San Luis Pass:	
(*a*) Quarantine physician at mouth of Brazos, one guard at mouth of San Bernard, and one guard at San Luis Pass	300
Total expenses incurred by the State on account of the above stations	1,620

GALVESTON, TEX., *October* 2, 1879.

DEAR SIR: I have just returned from the quarantine stations between this and Matagorda Bay. Dr. Rutherford accompanied me.

At San Luis Pass, Mr. Alonzo Shannon is quarantine guard. The quarantine flag is on the point of San Luis Island, next to the main channel. The boat used in boarding vessels is kept at the flag-staff. The residence of the guard is at Captain Follett's, on the peninsula, from which vessels can be seen for some distance. When a vessel approaches the bar, the guard crosses to the lower end of San Luis Island; then walks

8. Mouth of the Rio Grande. (Sketch map of Rio Grande from
mouth.)

9. Clarksville (and Bagdad, Mexico).

10. Importance of Bagdad as a quarantine station.

11. History and present condition of quarantine at the mouth of

12. Strong and weak points of the present quarantine at the
Grande.

13. Suggestions as to proper remedy for remote (permanent) app

I have sought information from all intelligent physicians, cust
county and city officials, intelligent citizens, especially old residents
and boatmen, officers of the United States Army and Navy, mem
Service, Mexican officials, to wit, medical officer, commanding gen
of Tamaulipas; American consul and vice-consul at Matamoras, i
of Matamoras, native and foreign, and by actual inspection of all
of, especially the sanitary condition of any place. Soundings of th
Santiago were made under personal observation, and are practical
concerns quarantine.

1. Brazos Santiago is on the northern point of Brazos Island. I
5 feet above tide-water. There are three small houses occupied
family and two other boatmen, about ten souls in all. There are
house, with a shed-room for telegraph office. Sea-going vessels land
passengers and cargo are taken by smaller vessels to Point Isabel
The waters of Gulf and Laguna sweep over the island (at this poin
The sand hills running along the center of the island are more or less
severe storm.

Padre Island has its southern extremity just across the ship-chann
ern point of Brazos. It is a narrow, low, sandy island, extending
Pass, parallel with the mainland, from which it is separated by th
It has a range of sand hills along its center which, I am informed,
with every severe storm. One of the light-houses is on the harbor s
and it was deemed necessary to use iron screw piles to strengthe
against storms. The light-keeper and his wife live in this light-
houses for fifteen miles up the island. The highest point (sand hi
of the island is about 8 feet above the sea.

Clark's Island is on the western side of Brazos, from which it is se
in high tide only. The west end is some 12 feet above the sea, and h
of about two square miles. It is covered with grass and has some ca
bushes growing on it. It is about 400 yards from the level of the gr
to a channel of three feet depth. Small skiffs can approach to with
land.

Point Isabel is on the mainland about one and a half statute mi
end of Clark's Island. Soundings were not made between Clark'
nearest point on the mainland on account of approaching darkn

on vessels and cargo before sailing and while *en route* for ports in this district: Vessels to be thoroughly cleaned and otherwise placed in good sanitary condition to satisfaction of inspector supervising the work; only such freights taken as are declared non-infected by the inspector; no passengers; and ship in charge of national inspector *en route*. No further restrictions to be required at the port of arrival. Dr. Bemiss answered: "Have repeatedly offered to do all that is asked, both to Dr. Rutherford and the governor, but get no response from either. With precautionary measures pledged by the National Board and health authorities here, Texas might open all her ports to New Orleans by way of the river as safely as to New York City."

Before my arrival at Indianola, on the 11th, the local authorities had passed a resolution raising the quarantine against New Orleans. But I considered that it was better to have an understanding with the State authorities, so as to come within the views of the State health officer in case he should have to investigate the justness of any quarantine against Indianola. I also found that the owners of the steamship line hesitated about ordering a ship from New Orleans until the State health officer and governor had expressed their opinion on the subject. The fear was that the ship might sail, and, before her arrival, the city council of Indianola might rescind the resolution admitting her, if the governor should express his disapproval of admission.

The following letter was addressed to Dr. Bemiss for the purpose of explaining my connection with the matter:

* * * "The first official information I had that New Orleans was no longer infected was through the National Board of Health Bulletin, received only a few days ago. I at once began to see what could be done in my inspection district toward removing the already modified restrictions, so that Indianola and Corpus Christi, which are without warehouse facilities at the quarantine stations, could carry on commerce with New Orleans as well as Brazos Santiago, which has a warehouse. To avoid any complications (such as towns in the interior or on the coast quarantining such ports as should open), I had a conference with Dr. Rutherford. He opposed unrestricted commerce for the present, but agreed to communication under the plan telegraphed you. I have submitted to members of the city council the views contained in your telegram to me. They say they will stand by their action, and a vessel from New Orleans will be admitted. They hope, as I have informed them would be done, that the representatives of the National Board of Health and the local authorities at New Orleans will see to it that no yellow fever is sent by the ship. It is possible that Galveston and Victoria and Cuero may quarantine against Indianola upon admission of the ship, but, by coming within the views of the State health officer in admitting the ship, it would be of only short duration. I have written to the authorities of Corpus Christi, giving them the substance of your telegram and expressing the opinion that they could open with New Orleans."

From Indianola I telegraphed Dr. Rutherford that Dr. Bemiss said, in answer to my telegram of the 10th, that he had offered to do all that was asked; and giving assurances there was no danger to any of the Texas ports under the restrictions pledged by the National Board and local authorities at New Orleans. On my arrival at Brownsville I received a dispatch from the steamship agents, requesting me to give Dr. Rutherford, "explicitly," the assurances from Dr. Bemiss, "as it was deemed important, to the end that Rutherford could approve and telegraph the governor at once." I then asked Dr. Bemiss by wire, "Do the precautions pledged by the national and local boards cover all the points asked in my dispatch?" I received the following answer: "Yes; all the points asked for are met." (Signed) "For Dr. Bemiss, I. H. Davidson, M. D., Inspector N. B. H." I at once telegraphed Dr. Rutherford: "Davidson, inspector at New Orleans, telegraphs, for Dr. Bemiss, that all points asked in my telegram from Houston are met." As far as I am informed, here the matter rests. I presume Dr. Rutherford communicated with the governor on the subject. What the governor will do I cannot surmise.

As far as I have been able to learn, the quarantine at Brazos Santiago has been successfully carried out since my last visit. The following vessels have undergone quarantine: Schooner Weaver, which had been engaged in lightering the Independencia at Bagdad, was brought to Brazos Santiago thoroughly cleaned, and detained four days in quarantine; the Hitchcock, from Soto la Marina, below 25° north latitude, 26 days' voyage, detained 60 hours at Brazos Santiago quarantine, and cleaned and fumigated; steamship Harlan, from New Orleans, arrived at Brazos Santiago September 29, after 3¼ days' voyage, with clean bill of health and no sickness, National Board of Health Inspector McCutchen on board; freight transferred to warehouse on Brazos Island; ship fumigated and disinfected, and sailed for Indianola to take on cargo of 200 cattle; freight detained at Brazos 60 hours and constantly fumigated.

At Bagdad the Mexican war vessel Independencia was quarantined for the same length of time as if she had entered at Brazos Santiago. The ship was from Vera Cruz, and had on board supplies for troops at Matamoros. I am informed by Mayor Corson that some of those detained in this quarantine murmured against it, and said there was no authority in the laws of Mexico for any such detention of passengers.

has presented itself. Quarantine physician would attend without
provided for.

"It has been the rule that all vessels subject to quarantine sh
If in bad condition, she is ventilated, fumigated, and washed. N
kept here of vessels put in quarantine."

In this connection, your inspector calls attention to the case of t
Chase, of New Orleans, as detailed in the following extract from a
the master. I find the statements substantially correct:

"On the 21st June, I cleared from Tampico, Mex., for Brazos Sa
clean bills of health; one from Mr. Cassard, United States consul,
the Mexican authorities. Have a crew of four men, myself and w
sengers. In ballast, dunnage, fuel, and seven barrels of water. O
was boarded by pilot, and, on coming to anchor, was boarded by de
inspector, A. B. Barton, who put my vessel under quarantine rule.
to remain in same condition until he communicated with the he
occurred the 27th of June. On the 28th instant [should be Jun
down and sailed around vessel, not coming within seventy-five ya
what he had to say, only part of which I could make out. He put
and had quarantine flag sent to masthead. Would not come himsel
or crew. I asked permission to go on Padre Island to get exercise,
He then retired. On Sunday, 29th, deputy inspector Barton and bo
antined, and sent to remain on my vessel during the term of quaran
me seven persons to provision, besides myself, wife, and crew. Th
my vessel a quarantine station. The reason given for having these
board, was that there was no quarantine ground or building at this
of July, Dr. Main made another flying visit in same style as previou
on board were complaining of wanting exercise. So I again begged
on the island; was again refused, and told if I went ashore I would
of $500. * * * My clean bills of health cost me $15. * * *
released out of quarantine after nineteen days close confinement, and
show effects of the close confinement we have been subjected to. I
my vessel's hatches were not closed from the 21st June until the da
(Signed) Henry Gibson, &c.

Barton inspected the vessel on the 27th June and went afterwards
where he and his boatman were arrested on affidavit of one Siebert,
antine guard under appointment of the *county*. They were sent on
Chase, and after expiration of quarantine were tried before justice of t
at Point Isabel, who discharged them for "want of jurisdiction."

"Previous to this year it was the custom to examine a vessel (leavi
a clean bill of health. It has not been the custom this year.

"Yellow fever occurred at Brazos Santiago in 1858 and 1867. The fir
from Havana in coffee; the last time, thought to have been brought
city, Texas, to which place it had been carried from Corpus Christi

chill and fever, pain in head and back, and great irritability of the stomach. From this time to date of my visit he says fever had not left him. On August 2 the temperature was 104°; pulse 120; tongue furred in center, with red edges; eyes suffused; intense muscular pain, principally along spinal column. Prescribed quinine (twenty grains, in two doses).

"August 3, 7 a. m.—Temperature 102.5°, pulse 108. He is a little better, from effect of a purge and the quinine; conjunctivæ slightly yellow; skin dry and burning; 6 p. m., temperature 105.5°, pulse 120; skin dry and parched; eyes suffused; respiration difficult; passed very little urine, loaded with sediment; heart's action laborious. Ordered cold sponging and niter and digitalis.

"August 4, 7 a. m.—Temperature 104.5°, pulse 120; passed restless night; is delirious; passed more urine, of a lighter color; heat and nitric acid show albumen; stomach retained a little nourishment; 7 p. m., temperature 106°, pulse 118. No urine today; very restless; skin dry and burning.

"August 5, 7 a. m.—Temperature 105.5°, pulse 130; vomited black vomit; 12 o'clock temperature 106°, pulse 130; black vomit and bloody evacuations; comatose; intense yellowness; 6 p. m., temperature and pulse same; died during the night. Examined the vomit and found black vomit corpuscles. Should have stated the spleen was much enlarged. No post mortem.

"All the physicians in the town saw the case. Dr. Motas says it was yellow fever. I think the diagnosis doubtful. All the other physicians say it was malarial fever."

I will state that Dr. Motas claims that hardly a year passes without his seeing one or more cases of yellow fever in and around Brownsville and Matamoros.

It is very probable a vessel of the Alexander line will touch at Bagdad about the 26th of this month. According to the terms of the subsidy granted this line by the Mexican Government these ships cannot carry produce from one Mexican port to another. They carry mails and passengers. The English steamers heretofore coming to Brazos Santiago via Mexican ports will probably come direct to Brazos Santiago and proceed thence to the Mexican ports. This will do away with the quarantining of these vessels. I was unable to hear of any Mexican vessels likely to come to Bagdad from infected Mexican ports.

The quarantine at Brazos Santiago and adjacent coast is conducted as when I last wrote. No arrivals of vessels from infected ports. Steamship Harlan is expected from New Orleans on the 25th instant. Indications are that she will be subjected to the same regulations as those heretofore in force. I did not advise any alteration of the regulations by the local authorities, unless the governor approved of the action of the Indianola authorities removing restrictions on vessels from New Orleans. You have doubtless received information of the governor's action opening Texas ports to New Orleans from and after 25th October.

The steamship Herves, on her last trip to Havana, lost fifty-six cattle *en route*, and twenty (or twenty-four) died after landing them. Thus a larger number of cattle died after precautions were taken to remove the sulphate of zinc. They died, as on the first trip, in the lower after hold. I stated in my report of October 6 that this part of the ship was least perfectly ventilated. Wind-sails guide the air to the after hold through a large hatch just abaft the engine-room. But there is no exit for this air except through this same hatch, for the floor is closed that separates "between decks" from the after hold. Thus an excess of chlorine gas might be pocketed in the back part of the after hold. Dr. McCleamley is positive that the only means of ventilation for the after hold is through the hatch alluded to. I have had no opportunity of personally examining the Herves. The information given in my report of the 6th instant, as to the construction of the vessel, was derived from parties who seemed familiar with her. I was told that special attention had been paid to thorough ventilation, and that it was very unusual to lose cattle on this ship, although she had carried many loads. During my visit to Indianola, on the 4th and 5th instant, I requested Dr. McCleamley to investigate the facilities for ventilating the ship, especially the after hold. He says, under date of October 21: "It is an utter impossibility for any gas to escape" from the after hold except by the hatchway. It would be easy to make ventilation more thorough here by having openings in the extreme aft portion of the floor separating between decks from the after hold. The air then, guided by the wind-sail, would pass down through the hatch in the forward part of the after hold and out through the above proposed opening, thus creating a current of fresh air through this part of the ship. The only other means of ventilating this part would be by hose and fan-engine.

In the dying cattle, "rigidity began before life was extinct." "So much was the odor from the decomposition that the crew could not skin any of the cattle." "The captain of the ship stated that post-mortem examination revealed ecchymosed spots in the kidneys, and a congested condition of the stomach." Dr. McCleamley was not informed as to who made the post-mortem.

This ship was lying off Indianola wharf October 21, to take another load of cattle.

year an effort was made to carry out this plan, but it failed through
Mexican quarantine physician, and the result was that Brownsville
amoras. About the first of last May the Texas State health officer an
authorities saw General Canales on the subject. The result was th
Dr. Combe, of Brownsville, quarantine physician at Bagdad, with
own discretion in everything connected with quarantine at that po
and file of soldiers are furnished to carry out his orders. The Mexic
him nothing for this service. An effort is on foot, which will dou
have him paid something by contributions in Matamoras and Brown
$150 per month will be raised in this way. He has his headquarter
and couriers inform him of the approach of vessels.

12. The Mexican Government has no quarantine law, and everyth
eral Canales in the matter is arbitrary. The reasons inducing thi
the part of the Mexicans I believe to be—(1.) A disposition of Gener
serve amicable relations with Americans. (2.) It is easier for co
through Brazos Santiago, thence by rail to Brownsville, and over to
it would be to have vessels land at Bagdad and haul cargo thence
true that in an emergency Mexican capitalists could purchase a steam
Grande River from Bagdad to Matamoras, but such a contingency is
revenues from the English steamers are important to the Mexican aut
six thousand dollars will be derived from this source within the
General Canales is already borrowing money from Matamoras
strength of this. Of course both the borrower and the lender are inte
Brownsville open to Matamoras. If Matamoras should become infec
dad, Brownsville would close all commerce with Matamoras. (4.)
(Mexican and American) between Brownsville and Matamoras are
a month to their owners. Though the principal route of commerce lies
ville via Brazos Santiago, there are small coasting vessels (of 40 to
at Bagdad on an average of one a month. They almost always c
ports, and generally bring coffee, sugar, and fruits; occasionally pa
itary stores. The schooner Mexican Eagle arrived at Bagdad a few
foul bill of health from Tampico. She brought eighteen or twenty p
them a brother of General Canales, with his family. They are now
Bagdad.

And now I come to treat of a matter that has complicated and thre
all the quarantine under the jurisdiction of Brownsville, and particu
mouth of the river. On my arrival I found that politics and privat
great measure influencing the action of city and county officials.
county were each trying to get control of the quarantine. The
time been a private enmity between Drs. Melon and Combe. Each of
was urged by respective friends as quarantine physician. Melon had a
the city and county boards; but it was discovered that he could not
eration of the Mexican authorities, and Dr. Combe would not have

During the dry season Elizabeth street, from Twelfth to Fourteenth, is sprinkled y means of a cart, paid by private contribution.

There are no public parks that are used as such. Washington square and the old emetery have been appropriated for the purpose, but they are not improved. Washngton square contains four acres; is low and flat; is covered with water, for want of drainage, after a hard rain. It has been used a good deal as a "dumping place" for he garbage carts. The old cemetery contains two acres.

About nine-tenths of the dwellings are inhabited by the owners. There are only some half dozen tenement houses in the city.

The jacalos are over-populated. The Mexican jacalo is from 10 to 15 feet square, 7 to 9 feet from ground to eaves, generally without floor or ceiling, one door, occasionally a window, some times a poor chimney: some times only a hole in the roof as exit for the smoke, the fire being built in the center of the jacalo. The body of the house is built by setting posts, making a frame-work of cane, and plastering this with mud. The roof is generally of palm leaves. From this standard there are many variations. One will have the body of the house made of barrel staves; another of old coal oil cans cut into pieces. Whole families of from four to ten individuals will occupy one of these huts, and the dogs and other domestic animals are allowed full freedom of the premises. I am told that the Mexican nation have no fear of small-pox and take no pains to protect the members of their families from the disease, even though the next door neighbor may have it.

The hotel on corner of Thirteenth and Elizabeth may be described as follows: The front is an old wooden structure two stories high; the balance is brick; that next to Thirteenth street is three stories high; the kitchen, lamp room, and office are one story, and the part containing the double dining hall is two stories high, the upper story being occupied by bedrooms. Of the three-story building the two upper stories are bedrooms. The brick pavement in the alley is badly worn and broken. A great deal of the refuse from the kitchen is thrown on this and washed and swept back into the street or public alley. The gross or heavy garbage is put into barrels for the carts and set in the alley. The privy has a pit some 15 feet deep. There is a large window here, but it is kept shut. There are three or four small grated ventilators near the ceiling. The rear of this hotel, about the privy and in the alleys, has been quite offensive, but there is some improvement in the condition of late.

The county jail is a one-story, wooden building 18 feet high, 25 feet wide, and 48 feet long, surrounded by a brick wall 18 inches higher than the main building. I am indebted to Dr. Wolff, county physician, for information concerning the condition of this building. He says: "From the above space is to be deducted some 18 feet, which is occupied by the guard on one side. The other is divided into two cells for women. In the center of these two is a door, 7 by 4 feet, the only door of the apartment. The average occupancy is twenty-two prisoners. Ventilation is by means of five holes, 3 feet by 4 inches, about on a level with the floor, double grated. There are five holes near the ceiling, 3 by 2 feet, also double grated. There is no privy. A bucket is placed in one corner of the room and used as privy. It is elevated some 2 feet from the floor, with a tube attached to it to allow the fecal matter to run off to the privy vault some 6 feet from the room. The act of defecation is performed in the presence of all the inmates. There are no facilities for bathing. No epidemics have ever occurred among the prisoners that I am informed of. The diet of the prisoners is beef, soup, bread, and water."

There are several old houses, built flat on the ground, on the corner of Elizabeth and Thirteenth streets, opposite Miller's hotel and the custom-house. It will be seen by reference to the map, that some of them are on the line of the old Resaca.

Any permanent sanitary improvement in Brownsville would have to consider grading and paving the streets, or using underground sewers. This would necessitate water-works. These improvements would require a large outlay of money in the beginning. But if the sewerage were utilized by irrigating a farm in the prairie outside of the town, it seems to me that in this land of long summer droughts (the great drawback to agricultural pursuits here) the proceeds of such a farm, in addition to the income derived from supplying water to the town, would, in the end, pay some one very well for the investment. The only other plan I can see is to have a well-regulated system of sanitary police the whole year round.

October 17.—The matter of having the Mexican Congress pass a sanitary inspection law has been discussed privately between Mayor Corson, Dr. Combe, and some of the prominent Mexicans. The sum of the result is that while I am hopeful, I see that there will certainly be opposition to it.

General Canales will doubtless remain in command on this border and his brother will almost certainly be the next governor of Tamaulipas. I think this favorable to carrying out quarantine at Bagdad next year. The American consul is absent from Matamoras. I have not spoken to the vice-consul on the subject of the proposed legislation, as I thought it best to leave the entire matter on the other side of the river in the hands of Mr. Corson and Dr. Combe.

Isabel to Corpus Christi.

The charts and tracings intended to accompany my report of 23d
ished and handed to me until the day of my departure from Brazo
were mailed on my arrival here.

I was at Indianola only a short time on my route to Corpus Christ
to personally inspect affairs there. I left with the health authorit
most of the points on which I desired information, and answer is pr
I return next week.

Only small sailing vessels come to Corpus Christi, and these gene
ola. A channel is being dredged through the bulkhead at Corpus
no vessels enter there yet. Aransas Pass has little more than 4 fee
bar at ordinary tide.

The quarantine station is at Shell Bank (inside Aransas Pass), wh
the only route from here to Indianola. I shall be unable to report
this port until I visit the quarantine station, as the quarantine phy
books and records there, about 20 miles from Corpus Christi.

The evils of a want of uniform quarantine regulations and co-
the various local boards in this district are more apparent than e
yellow fever have been reported in New Orleans. Indianola has no
Orleans (July 31). The town of Cuero, on the railroad from Indian
sent word to the mayor of Indianola that Cuero would declare
Indianola if the latter port did not restrict communication with N
health authorities of Corpus Christi seem inclined to quarantine
speak of quarantining against Indianola unless that city does the
present circumstances it is impossible for a passenger leaving one o
foresee whether he will be quarantined at the next. I am mindful
the settlement of these differences to the State health authorities ;
no cognizance of the matter until the overt act is committed, then
ities must make personal investigation into the merits of the cas
can be rendered. By the time the health officer could reach some o
district, and the decision could be made, an ordinary quarantine
exhausted.

August 3.—Learning there was no mail leaving here after six o'clo
six o'clock to-morrow (4th), I have kept open this report until after
ing of the city council to consider the adoption of the quarantine
National Board of Health. The council passed a resolution adoptin
tions, subject to the approval of the State health officer, with such
regulations as may be deemed necessary for this port. I have reque
resolutions, which will be forwarded to your office in due time.

The city council also declared quarantine against New Orleans
and placing restrictions on all goods leaving those places after Augus
to be a strong disposition to quarantine Indianola, unless that port
merce with New Orleans.

Near the quarantine station, there anchored in the middle of the river and all persons n board of her removed; the vessel is then allowed to come alongside and take on cargo with her own crew, and after her departure the barge is to be disinfected before eing allowed to return to the city. As authorized and empowered by the act of March 24, 1876 (see Appendix A), the board issued permits allowing vessels to come up to the city without submitting to the above regulations or to the prescribed period of detention, "whenever satisfied that they might safely be allowed to do so without damage to the public health or risk of contagion." The Bay Islands have also been elieved from the detention clause, it having been shown that no yellow fever existed there, and the owners of the steamship line plying thence maintaining a physician at Ruatan, appointed by the State board with instructions to keep a strict surveillance over the health of that port.

Such, in substance, were the methods of quarantine intended to be enforced, but Dr. Herrick, to whom I was referred by Dr. Choppin for further information, admitted that no vessel had fully complied with the regulations; that, in no instance, had a vessel been detained twenty days, or had her cargo removed at quarantine, or taken on her cargo there; and informed me that during Dr. Choppin's recent illness, it had become the custom for the owner, agent, or consignee of a vessel detained at quarantine, to go about among the individual members of the board soliciting their signatures to a permit of release, and that upon obtaining five such signatures the permit was forwarded direct to the quarantine station and the vessel allowed to proceed without any action having been had by the board in its collective capacity.

A partial list of vessels (see Appendix B), arrived since April 30, from ports included in quarantine restrictions was furnished by Dr. Herrick, and although it fails to give the specific dates of arrival at and release from quarantine, I found that the period of detention varied from twenty-four hours to eighteen days, and that as a rule it was from three to five days generally terminating by permit obtained in the manner above described. (I subsequently added to this list during my inspection of quarantine station.)

Much dissatisfaction with the quarantine regulations had, of course, grown up among the shipping and mercantile interests, and this had been fostered and encouraged by a portion of the medical profession who were hostile to the State board from political or personal reasons, or to quarantine on technical grounds, or who were influenced by other motives. This dissatisfaction had finally led to the change in the period of detention already mentioned. Concerning this Dr. Choppin explained that it was the intention to maintain an inflexible and inexorable quarantine of ten days' detention against all vessels arriving from infected ports, and believed that it could be done and would prove effectual in excluding yellow fever. In this connection the appended report (C) of the meeting of the board at which this action was taken are of interest, as reflecting to some extent the sentiments of the various members and of the community on this subject.

Foreseeing this conflict of interests and the dangers it threatened to the Mississippi Valley, I had during my previous visit to New Orleans as a representative of the sanitary interests of Illinois, obtained a promise from the Auxiliary Sanitary Association that it would not interfere, at least with the quarantine administration by the board of health, but I was now informed by Dr. Choppin that the association was among the most strenuous opponents of quarantine. This, I subsequently learned, could not apply to the association in its official action, although many of its members were bitter in their denunciation of the system as previously pursued.

Having apparently exhausted this phase of the subject I procured from Dr. Choppin a letter of introduction to Dr. Carrington, the medical officer in charge of the quarantine station, and made my arrangements to visit him. Finding it impossible to leave for this purpose until evening, I spent the intervening time in a general inspection of the sanitary condition of the city, the results of which will be found under that heading.

At 8 o'clock p. m., I left on the tow-boat Ocean for quarantine station having previously wired Dr. Carrington of my intended visit. Upon my arrival at 12.30 a. m., I was cordially met by that gentleman and upon learning that—except by the coast packet leaving at 4 a. m. from a point about one mile from quarantine station—there was no means of return to New Orleans for some indefinite time, I immediately proceeded to an inspection of the station and its surroundings by moonlight. Dr. Carrington, although evidently embarrassed by the visit, frankly told me everything which had occurred since the establishment of this quarantine and the difficulties which surrounded his position. An opportunity of judging to some extent of his professional attainments was afforded by his invitation to examine and consult with him upon the serious illness of his wife. From this and in other ways the charge which has been publicly made that he had not been in active practice for a number of years before receiving this appointment seemed entirely credible. I was favorably impressed, however, by his evident honesty of purpose, candor and general demeanor.

The quarantine station of New Orleans is located on the west bank of the Missis-

List of vessels put in quarantine at port of Corpus Christi, Tex.

Whence coming.	Name.	Length of voyage.	Date of arrival.	Bill of health.	Causes of detention.	Length of quarantine.	Number of crew.	Number of passengers.	Cases of diseases.		Cargo, nature of.	Remarks.
									On board.	In quarantine.		
Morgan City	Steamship Mary	48 h'rs.	1876. Oct. 2	Clean	Suspected	Fumigated and detained 3 hours.	20	None	None	None	General merchandise.	
Jamaica	Schooner A. W. Collins.	16 days	1878. June 27	do	do	Fumigated and detained 12 hours.	8	do	do	do	Bone dust	
Morgan City	Steamship Aransas	2 days	Aug. 2	do	do	4 days lightering	20	do	do	do	General merchandise.	Returned to sea.
Tampico	Schooner Lottie Mayo.	5 days	Aug. 14	do	do	7 days	4	1	do	do	Fruit	Do.
Lighter for Aransas.	Schooner Ripple		Aug. 5		Freight from Aransas.	17 days	2	1 in charge of freight.	do	do	General merchandise.	
Do	Schooner Aquis		do		do	do	2	None	do	do	do	
Do	Schooner Emma Clara.		do		do	do	2	do	do	do	do	
Do	Schooner Two Brothers.		do		do	do	2	do	do	do	do	
Do	Schooner Flour Bluff.		do		do	do	2	do	do	do	do	
Do	Schooner Alice		do		do	do	2	do	do	1 case malarial fever.	do	
Do	Schooner A. L. Fitch.		do		do	do	2	1 in charge of freight.	do	None	do	
Calcasieu, La	Schooner Susanna	20 days	Aug. 28	Clean	Suspected	3 days	3	None	do	do	Lumber	
Sabine, Tex	Schooner Rest	17 days	do	do	do	do	3	do	do	do	do	
Calcasieu, La	Schooner Moeling	17 days	do	do	do	do	3	do	1 case malarial fever.	do	do	
Do	Schooner P. Andrew.	11 days	Aug. 29	do	do	8 days	3	do	None	do	do	
Do	Schooner C. J. Gill	11 days	Aug. 31	do	do	9 days	3	do	do	do	do	
Sabine, Tex	Schooner None Such.	6 days	Nov. 1	do	do	14 days	3	do	do	do	Shingles	
Calcasieu, La	Schooner Moeling	11 days	do	do	do	9 days	3	do	do	do	Lumber	
Orange, Tex	Schooner Garnock	12 days	do	do	do	8 days	3	do	do	do	Shingles	

No vessel has ever arrived here with medical officer on board.

After visiting the boats, where we found the proper committee of the association perintending the matter, Dr. White and I proceeded farther up the river, where we und some 200 men in the employ of the association filling up a line of stagnant nds, nearly half a mile long and about 100 yards back from the river bank. On amining the material used for filling I at once saw the solution of the important uestion of raising the grade of the city. The material is a silt deposited in the bat- ures or docks at every rise of the river, and the supply is practically inexhaustible. nalysis shows it to contain only about 2¼ per cent. of organic matter.

From this point I continued my inspection, so that by 3 o'clock p. m. I had person- lly visited the greater portion of the city, including all points of importance. From ctual knowledge and observation I do not hesitate to say that not only does the work f the Auxiliary Sanitary Association evince intelligent direction and efficient effort, ut that to this organization is justly due the credit of making New Orleans one of he cleanest cities I have recently visited.

Copies of the publications, addresses, circulars, blanks, &c., of the association have already been submitted with my preliminary report.

At the office of the board of health I next examined the status of the house-to-house inspection, and found it nearly completed. So far as able to judge, the inspections appear to have been fairly well made; and, with the assistance of the Auxiliary Sanitary Association, which furnished ten policemen for the use of the board, many nuisances have been abated.

Upon inquiry it was ascertained that no precautions are taken to avoid error in the return of causes of death, either by investigation of suspicious causes of death, or by a daily examination of the returns by a medical officer of the board. When I state that there were reported 412 more deaths from malarial fever in 1878 than in the previous year, and that many of the creole doctors persistently deny that there was any yellow fever in New Orleans last year, the necessity for such precautions will be obvious. I strongly urged that these omissions be corrected forthwith, and that all reports of deaths from fevers and from different forms of congestions, where not clearly specified, be carefully investigated.

Copies of publications, blanks, &c., of the State board accompanied my former report. It should be added that the efficiency of the board is seriously impaired by want of funds; no appropriation is made for it by the legislature, and its entire revenue is derived from quarantine charges and a fee for registration of marriages, births, and deaths.

During my visit I was consulted by many medical men and others about sanitary matters, the quarantine, the proposed action ef the National Board, and kindred subjects. The diverse views concerning quarantine, the local or exotic origin of yellow fever, modes of prevention, disinfection, &c., were presented at length and not infrequently with considerable passion and bitterness. In these interviews, and whenever other opportunity presented, it was sought to comply with the instructions "to use my best influence with the sanitary authorities to induce them to enforce a proper system of quarantine, and to consult freely with the National Board." It is safe to say that for the past two and a half months more attention has been paid to sanitary science and sanitary matters in the city of New Orleans than in any other city in the United States, and so far as municipal sanitation goes there is so much of present accomplishment and promise for the future as to leave little to be desired.

JOHN H. RAUCH.

THOS. J. TURNER, M. D.,
Secretary National Board of Health.

APPENDIX A.

OFFICE BOARD OF HEALTH, STATE HOUSE, STATE OF LOUISIANA,
New Orleans, ———, 187—.

To owners and shipmasters:

For your information and guidance the following are respectfully submitted, viz:

ACTS ESTABLISHING AND REGULATING QUARANTINE.

"SEC. 13. * * * Every master of a vessel subject to a quarantine or a visitation, arriving in the port of New Orleans, who shall refuse or neglect, either—first, to proceed with and anchor his vessel at the place designated for quarantine at the time of his arrival; second, to submit his vessel, cargo, and passengers to the examination of the physician, and to furnish all necessary information to enable that officer to determine what quarantine shall be fixed for his vessel at the quarantine ground during the period assigned for her quarantine, and while there to comply with the directions and regulations prescribed by this act, or by the board of health, or with such direc-

tracts of this act to be made as they may deem necessary for the info
of vessels arriving in this State; and shall cause a sufficient numbe
delivered to the pilots, to be distributed to masters of vessels arriv
vided.

"SEC. 21. *Be it further enacted, &c.*, That every pilot or other per
shall deliver to the master of every vessel inward bound, one co
extract from this act, which shall be furnished him by the board o
pilot refusing or neglecting so to do, or aiding or landing any pass
son contrary to this act, shall forfeit one hundred dollars for every

"SEC. 22. *Be it further enacted, &c.*, That every person who shall
vessel, while performing quarantine, without permission of the re
his assistants, shall forfeit the sum of fifty dollars."

An Act, March 24, 1876.

"SECTION 1. *Be it further enacted by the Senate and House of Represe
of Louisiana in general assembly convened*, That the board of healt
Louisiana be and is hereby authorized and empowered, at its discre
to cause the detention at quarantine stations, for purposes of disinfe
tion, and to disinfect, fumigate, and purify any or all vessels from p
low fever usually prevails, or from ports where other contagious or i
are reported to exist, and after such disinfection, fumigation, and pu
antine, to permit the passage to the city of [New Orleans] of such
without any prescribed time of detention, when it is satisfied that th
properly and sufficiently disinfected and purified so that said vessel or
be permitted to pass without damage to the public health or risk of

SAML. CHOPP

B. F. TAYLOR, M. D.,
Secretary.

APPENDIX B.

*List of vessels arriving at the port of New Orleans during the month o
ports included in quarantine proclamation.*

Vessel.	Master.	W
S. S. E. B. Ward, jr	Pizatti	Ruatan.
City of Mexico	McIntosh	Vera Cruz and
Chase	Baker	Havana via

to remain. Of this latter there was a goodly quantity on board, we
bottom of the hold. The keelson had not been examined, and of th
bilge there was no knowledge, except by the offensive odor of the
she first came in, to destroy which the health officer had ordered thr
(impure coal-tar creasote) carbolic acid to be poured down the pump,
pumped out several times since. The hold had also been sprinkled
carbolic acid, one part to four parts of water, and twice fumigated
or twelve pounds at a time, for three hours—frequently looking i
that no damage was done by fire. The cabin and forecastle had bot
with four or five pounds of sulphur, but no pains had been taken
doors opened or bedding exposed, otherwise than as it lay in the bun
uncertainty whether the outer doors were closed during the process.
reported by the captain to be twenty years old, and she had eviden
usage, with little or no attention to cleanliness. She had much rott
parts saturated with dirt. On having the ballast removed a case
covering the keelson ripped open at the bottom, and a string of dun
up; the dirt shaken down by the hammering filled the keelson aln
could be opened. There was a faint odor of carbolic acid in the filt
pump, but everywhere else the odor of bilge-water prevailed. T
much surprised and the captain profane because all this had not been
saw necessity for further detention without awaiting for orders.

I recommended to the health officer to have all the filth that could
the keelson and timbers, to use a solution of copperas freely througho
otherwise until the bilge was devoid of odor, and then (having roug
pubic capacity of the hold to be about 130,000 cubic feet), with the
have all the ports closed and fumigate with sulphur; to use a barre
distributed in a sufficient number of kettles, each one-half full; a
them all and escaping, batten down as tightly as possible for twenty
cabin and forecastle, remove and destroy all worthless material, open
chests, and boxes, loosen out or hang up all bedding and clothing, an
all port-holes disinfect with sulphur in the same proportion as fo
pounds to every 1,000 cubic feet, tightly closed up for twenty-four
been my usual instruction and practice in the use of sulphur with
pressure and penetration of the acid into all porous as well as op
much absorption as possible by the bilge-water and filthy mud out
the timbers, and for such length of time as may reasonably be suppo
the destruction of all organic matter living or dead and the comple
of the emanations therefrom.

Throughout this inspection I had the pleasure of being accompa
Austin, the acting president of the Louisiana State board of health,
pend copy of his report to the board, in special meeting, convened
(Marked Board of Health.)

alth officer shall have boarded and inspected her in accordance with previous regu-tions and shall have quitted her.

SEC. 2. *Be it further ordained*, That any owner, master, or other person in charge a vessel which shall fail to stop and anchor and remain as required by section 1 of is ordinance, or, having said physician or health officer on board, shall take him, ainst his will, beyond the limits of said station; or any master or other person in arge of a vessel who shall refuse to answer any questions pertinent to matters of arantine, health, &c., or who shall fail, when interrogated, to give full information specting his vessel, the health of the crew, the voyage, or any matter essential to e requirements of the quarantine regulations, &c., shall be liable to a fine not exceed-g two hundred and fifty dollars for each and every offense.

The quarantine physician is instruced to report all violations of this ordinance to the torney general of the State and to the president of this board.

SAM. CHOPPIN, M. D.,
President.

S. S. HERRICK, M. D.,
Secretary.

The station consists of limits on water front, marked by large sign-boards, including bout half a mile between, as the anchorage ground for all vessels subject to inspec-tion, until visited by the health officer. The health officer resides in the fort A ilapidated old army hospital, a mile back of the fort on a hillock surrounded by marsh, is supposed to represent hospital accommodations. But a look through the windows (the key could not be found) was sufficient to show that, in case of arrival of any sick at quarantine, they will have to remain on board the vessel in which they arrive. I accompanied the health officer in an official visit to a schooner laden with lumber. From what I witnessed, and all I could learn, am satisfied that the examina-tions have been very superficial, and of no practical utility; the chief object of the station appears to be the collection of quarantine revenue, under special ordinance as follows—(printed document 15):

NOTICE.

OFFICE OF BOARD OF HEALTH, STATE OF LOUISIANA,
New Orleans, July 7, 1877.

At a regular meeting of this board, held Thursday, July 6, 1879, the following ordi-nance was adopted:

AN ORDINANCE relative to quarantine.

Resolved, That every vessel arriving at the quarantine stations known as the Rigolets and Atchafalaya shall be visited and boarded by the resident physician at such stations for the purpose of inspection, and every vessel arriving at said stations, and so visited and boarded by the resident physician, shall pay the following quarantine fees, viz:

For every steamship	$10 00
For every steamboat	5 00
For every ship	5 00
For every brig	3 50
For every schooner	2 50
Sloop, smack, or lugger, not under 25 feet long	1 00

The resident physicians are hereby ordered to enforce the above ordinance.

SAML. CHOPPIN, M. D.,
President Board of Health.

B. F. TAYLOR, M. D.,
Secretary Board of Health.

A test case of right under this ordinance has been decided in the courts against the board of health, since which time passing vessels treat the health officer with contempt, allow him to board in most cases, but refuse to pay charges or to answer inquiries. Of 1,012 vessels boarded since May, 12 only have paid dues. One only was found to be infected, had had a death on board supposed to be from yellow fever subsequent to leaving Tuxpan, Mexico, and before arrival; and two from infected ports. They were fumigated in the usual way and allowed to proceed after a few days' detention; had no power to prevent them. At English Lookout, a customs station between the Rigolets and Pearl River, I learned that vessels frequently pass from infected places without subjecting themselves to visitation; that one in particular, the Theresa G., engaged in the Havana trade, has habitually done so since 1877, and three times this year; that a few weeks ago she so passed, and discharged her crew from Havana at Pearlington, whence they proceeded direct to New Orleans with baggage. A new crew was shipped at Pearlington.

ance of water and good anchorage within easy boarding distance
side of this island. But at the west end in particular, from opposi
deep water extends to within two or three hundred yards of th
was built a government wharf during the war, which admitted vess
alongside. It has entirely washed away, but the place is practicab
stantial one, and in an economical point of view, as well as conveni
this would be the best situation for such a structure and warehouse
cer's residence and hospital, the most desirable situations are near
with slight dredging would admit of accessible and easy landing in
the event of making this island a quarantine station there woul
stevedores' quarters, for which two of the best of the old buildings
house and the fort, built for war purposes, could be repaired at con
than putting up a new building. An examination of a coast chart of
will, I think, satisfy the Board that this is a peculiarly appropriate
tine establishment, covering a wide sphere of usefulness. I have
to elicit the opinions of merchants in New Orleans, who have borne
Mississippi quarantine, whether it would not, to a great degree, do
they now have; and with almost one accord they commend it, es
fected vessels. One obstacle only is raised—that of freight on disc
loadingin quarantine to and from New Orleans. But even this,
volves less aggregate cost than that which now obtains with the s
at the Mississippi station. I therefore recommend Ship Island for a
to be provided with all the paraphernalia necessary to a complete est
for the care of naval as well as merchantile vessels.

5. September 26.—*Biloxi:* Accessible by Ship Island and Round Is
no quarantine, and the general sentiment of the people opposed to

6. September 27.—*Pascagoula:* This place is of considerable and gr
importance, and has a special trade with the West Indies and Mex
of vessels for 1878 was 43: from January to date of this inspecti
these being since June 1.

The quarantine laws of this port and county are herewith inclosed
the administration of earnest officers who, on the completion of the
gress on Round Island, will no doubt conduct the service intellige
ings consist of hospital, equal to 16 beds, residence for health offi
with sufficient accommodation for boatmen. These are well situate
and well arranged. They are in a forward state of progress and abu
for the station: for, with a complete establishment at Ship Islan
arriving at Pascagoula should be sent to it.

7. September 29.—*Mobile Station, Fort Morgan:* Here there is at
provision than that of boarding officer and designated anchora
officer resides, temporarily, in one of the houses of the military esta
rough wood shanties, 20 feet apart, approach completion, intended f

these spaces in the process of disinfection; in all which Dr. Fowler took deep interest, and expressed much gratification with the advantage the inspection had afforded him.

In passing criticism on the uselessness of the means commonly practiced at the quarantines which I have inspected, I particularly desire to be understood that I have not intended to reflect upon the officers in charge. These gentlemen I have found, without exception, disposed to do the best they could under the circumstances. As a rule, they are poorly paid, uncomfortably situated, and frequently hold their offices subject to the caprices of politicians whose interest ceases with the appointment. In my contact with the officers I have endeavored in all cases to make my inspections practically useful by suggestions and opportunities, which have been received with such expressions of gratification from them as to leave no room to doubt their sincerity or question the heartiness of the welcome which has everywhere met me in the exercise of my duties.

I have the honor to be, very respectfully, yours,

A. N. BELL,
Quarantine Inspector National Board of Health.

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

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ART. 2. If any person owning or using a privy, or necessary house, shall keep and e the same in such a way as to make it offensive to the public, or to any person liv- g in the vicinity, he shall be subject to a fine of not less than five dollars for each ense. And each day he shall keep and use the same in such way, after being noti- d by the marshal, shall constitute a separate offense.

ART. 3. It shall be unlawful to remove the contents of any vault, privy, or neces- ry house, in this city, at any time between the 1st day of July and the 1st day of tober, in any year, except with the permission of the mayor, and in accordance ith such directions as may be prescribed by the common council. And it shall be nlawful to remove the same at any other time of the year except between the hours ten o'clock at night and four o'clock in the morning. And any person offending gainst either of the provisions of this section shall, upon conviction, be fined in a m not exceeding ten dollars for each offense.

ART. 4. It shall be unlawful for any person to throw, place, leave, or deposit, or per- it his or her servant, or any other person of his or her family, to throw, place, leave, or eposit, the carcass of any animal, or any carrion, putrid meat, fish, entrails, or other un wholesome substance, in any square, street, or alley, or upon any lot within the city, or pon any ground within the limits thereof, except upon such ground or place as shall rom time to time be designated by the mayor for such purpose. And for every viola- ion of this section the offender shall be subject, upon conviction, to a fine of not more than five dollars for each offense.

ART. 5. It shall be unlawful for any owner or occupant of any store, house, stable, or other tenement, or of any lot, yard, or inclosure in this city, to permit any of the substances or things mentioned in the last preceding section to be or remain in or upon said house, store, stable, or other tenement, or lot, or inclosure, or between the same and the center of the street adjoining, under a penalty of not more than five dollars for each day the same shall remain thereon.

ART. 6. Every owner or keeper of any animal which may die within the limits of the city shall forthwith remove, or cause to be removed, the carcass of the same, to the place designated by the mayor for such purpose. And for refusal or failure to comply with the provisions of this section, each owner or keeper shall be subject to a fine of not less than five dollars.

ART. 7. And any person who shall throw or discharge from his house, factory, or lot, into any street, avenue, or alley, in this city, any noisome or offensive liquid or substance prejudicial to the health of persons residing in the neighborhood of, or offensive to persons passing by, said house, lot, or factory; and any person keeping on premises occupied by him any animal or vegetable matter that is generally offensive to persons residing in the neighborhood, or deemed prejudicial to their health, shall, for each offense, be subject, on conviction, to a penalty not exceeding five dollars.

ART. 8. The mayor of the city is hereby authorized to prohibit and prevent the introduction into the city of any infected article, which, in the judgment of the physician appointed to examine the same, may endanger the health of the city. And any person or persons willfully or knowingly introducing into the city any such infected article contrary to the prohibition aforesaid shall be subject to a penalty of not less than five dollars nor more than twenty-five dollars for each offense.

ART. 9. It shall not be lawful for any person to skin any dead animal that may die within the limits of the corporation, or that may drift on the shore, without immediately burying, or in some other way destroying and removing the carcass to the place designated by the mayor for such purpose. And any person violating the provisions of this article shall be fined in a sum not less than ten dollars nor more than twenty-five dollars.

Approved May 9, 1873.

SAM. M. JOHNSON, *Mayor.*

Attest:
STEPHEN MINOT, *City Recorder.*

INDIANOLA, TEX., *September* 5, 1879.

SIR: Since my last report I have visited the quarantine stations and other points between this and Corpus Christi.

The officials (mayor and board of aldermen) of Corpus Christi have furnished me the following, in reply to questions in Schedule U, sanitary survey.

(1) The total amount of money appropriated by the city for sanitary purposes for year ending April 1, 1879, $1,044.

(2) Amount expended for each of the following items: (1) deep drainage; (2) sewerage; (3) paving; (4) repair of streets; (5) street cleaning; (6) removal of ashes and garbage; total, $632.60. (They stated that they had no means of ascertaining the amount paid for each item.) (7) scavengering, $68.50; (8) construction and

Dr. Rutherford, the State health officer, arrived at Brownsville on the
for the purpose of arranging for modifaction of the quarantine, as contemplat
governor's proclamation, No. 5. I inclose you a copy of the restrictions drawn
Dr. Rutherford, concurred in by myself and approved by the local health
They have been forwarded to the governor, who, it is hoped, will make the
orders to carry into immediate effect. It is designed that the warehouse,
very well adapted to the proposed purpose, shall be used for it exclusively
State can furnish the necessary buildings.

The owners of Clark's Island price that property at $2,000. I do not recom
purchase at that price. There is serious doubt as to the ability of the parties
possession of Brazos warehouse to make valid title to the site.

In reopening commerce with New Orleans, Morgan City, Havana, and other
ports, it would be desirable to have any inspectors, under the National B
Health, superintend the fumigation and inspection of vessels before leaving
ports for the Texas coast. The State health officer requests that this be done
ever it can be, and that a certificate to that effect be given each vessel on

From Brownsville and vicinity I go, in company with the State health office
Indianola, thence to Corpus Christi and other stations on the coast between
Galveston.

Indianola is permitted to reopen trade with infected ports, under restrictions
I inclose. A quarantine guard has been placed by Dr. Rutherford at the
Caney or Mitchell's Bayou, near the head of Matagorda Bay, since my last rep
that point.

At Galveston, which I will reach about the 22d instant, I will await further
from the executive committee, as I will have finished all investigations in my
that are deemed important under present instructions.

Very respectfully,

JNO. H. POPE,
Sanitary Insp

Dr. T. J. TURNER,
Secretary National Board of Health, Washington, D. C.

THE STATE OF TEXAS,
City of Brownsville:

Be it remembered that at a regular session of the board of aldermen in and for
city of Brownsville, Texas, held on the 16th day of September, A. D. 1878, the fol
ing ordinance was formally adopted and duly spread upon the proper record of
city, to wit:

* * * * * * *

SEC. 3. That it shall be the duty of the health physician to abate any and all
sances which in his judgment shall be injurious to public health, to require the fi
up, draining, and regulating of any lot or lots, grounds or yards, streets or
places of the city, which shall be unwholesome, or have stagnant water, or from
cause may be in such condition as to produce disease, and shall do and require
done anything necessary in regard to cleansing and disinfecting privies and sink
filling up the same, as also to require the cleansing of any house, building, lot,
or ground, from any impure or unwholesome matter of any kind.

SEC. 4. That for the purposes hereof, and for the proper and prompt exercise of
powers herein conferred upon the health physician and health inspectors, the
invested with all the powers of chief of police. And the health physician is au
ized to enter houses, public and private, or other places, first asking permis
the owners or occupants thereof.

SEC. 5. That any work necessary in the opinion of the health officer to be done
any street or alley or other property of the city, the said officer will call on the
mittee on streets and landings to have the same performed; and any filling or
work which the health officer shall require of the owner or occupant of lots and
erty, unless the said requirement shall be immediately complied with, the said
shall report to said committee, who will have the same done without delay, and
furnish the mayor with an exact statement of all expenses on account of any su
or lots, buildings, &c. And the mayor will take the necessary steps for the coll
of the same under the provisions of section 124 of the charter of this city.

SEC. 6. That every physician in the city shall report under his hand to the h
physician the name, residence, and disease of every patient whom he shall hav
of any infectious or pestilential disease within six hours after he shall have v
such patient.

SEC. 7. That any person who shall neglect or refuse to do any act which the h
officer is empowered to require to be done, or which is required by this ordinan
which shall in any manner obstruct, hinder, or delay the health officer in the pr

Ill U.S. National Bd.of
B1 Health. Annual report.
1879 1364

NAME	DATE DUE